

BENEFITS AND LIMITATIONS OF EVIDENCE-BASED DENTISTRY IN THE INDIAN CONTEXT

Varun Suri* | Vanita Suri** |

Abstract

The American Dental Association defines the evidence-based dentistry (EBD) as “an approach to oral health care that requires the 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” [1].

Nowadays, evidence-based care is regarded as the gold standard in health care delivery. Published reports of research projects constitute the basis of EBD. They are analyzed systematically in meta-analysis.

This paper investigates the concept of evidence-based dentistry, its benefits and its limitations.

Keywords: Evidence-based dentistry – clinical practice – decision making.

IAJD 2016;7(1):118-123.

AVANTAGES ET LIMITES DE LA DENTISTERIE BASÉE SUR DES PREUVES DANS LE CONTEXTE INDIEN

Résumé

L’Association des Dentistes des Etats Unis définit la dentisterie fondée sur des données probantes comme «une approche aux soins de santé bucco-dentaire qui nécessite l’intégration des évaluations systématiques des preuves scientifiques cliniquement pertinentes, relatives à la situation et à l’histoire orale et médicale du patient, à l’expertise clinique du dentiste et aux besoins et préférences thérapeutique du patient» [1].

De nos jours, les soins fondés sur des preuves sont considérés comme l’étalon-or dans la prestation des soins de santé. Les rapports publiés des projets de recherche constituent la base de cette dentisterie. Rapports et résultats d’études sont analysés systématiquement par des méta-analyses.

Cet article étudie le concept de la dentisterie fondée sur les preuves, ses avantages et ses limites.

Mots-clés: qualité des soins – décision thérapeutique.

IAJD 2016;7(1):118-123.

* Post-graduate student
Public Health Dentistry,
Swami Devi Hospital and Dental College,
Panchkula, Haryana, India
drvarunsuri@gmail.com

** Professor,
Department of Obstetrics and Gynaecology,
Post Graduate Institute of Medical Education
and Research, Chandigarh, India

Introduction

Evidence-based medicine (EBM) has been defined as “the conscientious, explicit, and judicious use of current best evidence in making decision about the care of individual patients” [2]. It is a thoughtful integration of the best available evidence, coupled with clinical expertise [3]. It enables one to address healthcare questions with an evaluative and qualitative approach. It is about applying the best available research evidence in provision of health, behavior and education services to enhance outcomes [4].

In the 21st century, the practice of dentistry is becoming more challenging because of the information explosion regarding dental materials and equipment and the increasing need for continuous professional development.

Evidence-based dentistry (EBD) has been gaining even more importance in the past few years in order to reduce the gap between clinical research and actual dental practice. The clinical research is the basis for EBD; it allows us to make decisions about the causes of a disease and its treatments, while allowing for the natural differences between people.

Dental education and dental care delivery systems are greatly improved in India due to the increased dental health workforce and development in the field of dental research. However dental graduation training program in India is mainly targeted towards preventive and curative dental procedures. There is a lack of emphasis on the application of EBD in practice. On the other hand, the term EBD is widely used, but not widely understood among post-graduates due to the lack of in-depth training to distinguish good science from poor science. Most of the post-graduate dental students' clinical questions and problems are solved by a combination of instructors intuition, training and clinical experience, which may or may not be based on scientific evidence.

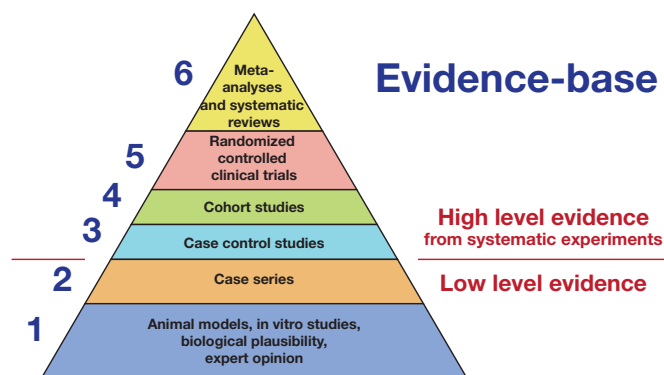


Fig. 1: Levels of evidence in evidence-based care.

The main goals of EBD are [3, 5]:

- 1- Getting the best evidence / research;
- 2- Transfer of that evidence in practical use.

Graduates from dental schools are up to date with the best practice in dentistry at the time they graduate. Some of this knowledge gradually becomes out of date as new information and technology appear. It is important, especially with regards to patient safety, for dentists to be able to keep up with developments in diagnosis, prevention and treatment of oral diseases, and newly discovered causes of diseases.

Benefits of evidence-based dentistry

It is well known that implementation of research evidence into clinical practice is an important component of any health care practice [3, 4]. However, research findings are inadequately disseminated and transmitted to practitioners who tend to resist accepting new information or applying new techniques. Since the inception of EBM in the early 1990s, the rapid growth of internet has made it easier for practitioners to gain access to most current evidence [6]. It is clear that dentists, members of the dental team, and patients are the primary targets for continued evolution of EBD. The importance of EBD can be applied to the following:

EBD and dental education

Contemporary dental education has evolved over many years. The University of Maryland School of Dentistry is the dental school of the University System of Maryland. It was founded as an independent institution, the Baltimore College of Dental Surgery, in 1840. It is known as the first dental college in the world [7, 8].

Gradually all proprietary dental schools were closed and were replaced by university based program in order to maintain the teaching standards and educational quality. As the evidence based medicine became popular, incorporating the EBD was needed. Wide variations in practice patterns and outdated approaches to the dental treatment were applied. Currently, significant time in curriculum is devoted to teaching the principles of EBD.

Benefits for the practicing dentists

The application of EBD in clinical practice implies many potential benefits to the practicing dentists. Treatment plans are customized based on clinical judgment and experience as well as scientific evidence. Also, there is reduced overhead and improved production by saving time and money using techniques and materials that are effective and efficient.

Benefits in research

EBD is a method for gathering, selecting and applying the best evidence in clinical practice.

It encourages the students and clinicians to carry out research in the areas where there is need of evidence, such as multicentric randomized studies, systematic reviews and meta-analysis.

Levels of EBD

The idea of dental practice based upon sound, evidentially-based concepts has been embraced by the American Dental Association and the Commission on Dental Accreditation (CODA) in their new mandates for dental education [9].

It is appropriate to represent the levels of evidence as a pyramid, with the reliability of evidence highest at the apex (Fig. 1). The lowest levels are expert opinion, biological plausibility, laboratory bench research, animal studies and then case-series. The adjective “low-level” does not refer to the intrinsic (or inherent) quality or value of the evidence, but rather as to how such evidence is valued when it is used as a basis for making clinical decisions for humans.

High-level evidence consists of controlled systematic experiments in humans: primarily case-control studies, cohort studies and randomized controlled trials. Instead of using deductive reasoning to connect a cause to its effect in humans, observations are made on a sample of subjects and are generalized using inductive inference.

Case-control studies and cohort studies are commonly used to elucidate causes of disease, and often form the basis for public health recommendations. Case-control studies can show associations between variables but cannot however prove causality. Randomized controlled trials are at the top of the evidence pyramid, since these trials eliminate many of the inherent and often uncontrollable biases present in case-control studies and cohort studies by randomly assigning individuals to different treatment groups.

Systematic reviews and meta-analyses synthesize the results of several

randomized controlled trials; they offer the highest level of evidence.

Limitations of EBD

A range of limitations of evidence-based healthcare have been identified. Briefly, these can be listed as follows [10]:

- Shortage of coherent and consistent scientific evidence.
- Difficulties in applying any evidence to the care of individual patients.
- Barriers to the practice of high-quality medicine.
- The need to develop new skills in identifying answerable questions, searching for and critical appraisal of the evidence.
- Limited time to master and apply these new skills.
- Limited evidence of positive patient outcomes following EB interventions.
- Limited access to resources to provide timely access to evidence in clinical settings.

The above limitations do not relate to the approach but rather to the implementation of an EB approach to healthcare. To implement EB healthcare, support for practitioners, educators and students is needed to develop skills within integrated settings, and to evaluate available evidence, including information provided to assist in the application of this evidence to individual patients [10].

Managing uncertainty

Whilst it is clear that the evidence base in oral healthcare is not as fully developed as in medicine, the limitation of evidence raises other key concepts that students and practitioners need to manage, especially in a country like India. Specifically, a lack of evidence is not evidence of any effect whatsoever, and students and practitioners also need to learn to manage uncertainty [11].

As part of managing uncertainty there is a need to support students to understand and work with the concepts of efficacy and effectiveness and together with Evidence-Based Oral Health

Care (EBOHC) and risk assessment, these may assist in informing clinical decisions. Otherwise if the definition of appropriate evidence is too narrow, there is a risk of allowing uncertainty to cause paralysis in healthcare or unreasonably abandon EBOHC principles rather than use them to acknowledge and manage uncertainty constructively [12].

Misperceptions about EBD

Other criticisms of EB healthcare are really ‘misperceptions’ which arise from ignoring key aspects of the steps in EB processes [10]. EB healthcare does not ignore or devalue clinical experience or patient or community values, but rather requires integration of evidence with clinical experience and expertise, and patient’s or community’s values to reach appropriate decisions.

Lack of universal applicability

There is also the issue of the application of guidelines developed for one population being applied to another population which may have different disease prevalence [13]. Both of these issues can be addressed through the development of effective critical appraisal skills and by the use of criteria to evaluate clinical guidelines development [14], with subsequent redevelopment of appropriate guidelines for the Indian context.

Socio-cultural elements

Socio-cultural factors that influence the application of evidence in decision-making include patients’ demands for care, and their beliefs and perceptions of what is appropriate care. Requests for inappropriate tests/treatments can lead to poor adherence to clinical guidelines [15]. The influence of patients on their own care has been demonstrated in oral healthcare, where treatment philosophies and care provided have resulted in patients’ preferences overriding evidence [16].

Therefore, we need to support students and practitioners in developing competence in communication

skills related to managing conflict, as well as educating patients on the management of their problems. This aspect of patient care may be further assisted by the development of decision aids, which have been reported to be effective in supporting patients in making informed decisions [17].

Concerns about professional autonomy

The professional autonomy of clinicians might be at risk due to misuse of EBD in practice. Supported by their own interpretation of the “right way” to treat a particular condition, gathered from any evidence-based information according to their whims and fancies, Managed Care Organizations (MCOs) and health plans (private as well as governmental) might well seize the opportunity to limit services and procedures provided by such plans to save money. Such acts will leave no place for the discretionary ability of a dental clinician to apply the art and science of dentistry in practice.

While EBD is a very promising way towards better health care, there will always remain the fear that cookbook types of dental protocols might replace the appropriate integration of the best available evidence with sound clinical judgment for treating patients [18]. Mere guidelines cannot, and should not, be used to replace face-to-face contact with dental professionals, which allow patients the opportunity to raise questions and concerns regarding their treatment.

Legal hassles

Once the Indian dental scenario gets sufficiently mature, the interpretation of any EBD practice will present new challenges to the judicial system as courts seek to codify and simplify legal issues in the entire health care field. After-the-fact culpability charges shall result in very complex dental liability issues. Expert witnesses will need to be better educated and well-versed in the current evidence-based literature and resulting systematic reviews in a particular area of dentistry.

Doubts on practicability

Many studies in dentistry as well as medicine unavoidably lack inclusion criteria, hence their practical and immediate application in patient care is limited to a narrow patient base. Hence even the best designed and implemented trials (randomized, controlled and otherwise) need to be assessed in their proper context when applying them to clinical problems.

Everything cannot be proved

In order to achieve a maximal control, the control group should match or presents a very small difference compared to the experimental group. However, this can be difficult to find or even sometimes impossible to find. This makes proving any hypothesis merely difficult. Very rare conditions preclude the application of EBM principles just because a sufficient number of cases cannot be found to be considered as substantial evidence.

Organizational issues

Organizational considerations have to be taken into account because of the functioning of research in the framework of institution and financing of research. Because of a lack of funding or the lack of somebody who champions the project in funding committees, not all questions that deserve answering find a place on the agenda of organizations.

Inapplicability to specific products

Finding evidence for one specific product is not always as easy as finding evidence in a general way. This is because a product's turn-over generally is faster than the process of setting up a clinical study, performing it, interpreting the results, writing of the report and having it published. In a study by Dr. Bottenberg, two out of the three composites tested were no longer available by the time of publication of the study [19].

Voluminous / jargon- full reports

Studies have shown that Indian postgraduates lack adequate skills to

appraise scientific journals, mainly due to limited knowledge of the terminologies used in evidence-based dentistry [20]. Dental curriculum should be modified to overcome this barrier. It is clear that evidence-based dentistry must strive to be a practical and beneficial aid to the average dentist, and that the generation of copious and erudite documents must therefore be avoided.

Inherent limitations in systematic reviews

There are some inherent problems and limitations of some systematic reviews, meta-analyses and randomized clinical trials that are not as well-recognized in dentistry as they are in medicine.

There are several limitations of systematic reviews. First, Flores-Mir et al. [21] found that the search and selection methods of current systematic reviews in orthodontics, for example, (i.e., from 2000 to 2004) are limited in that key methodological components are frequently absent or not appropriately described. For the 16 orthodontic systematic reviews for this time period, many failed to search more than Medline (56%), 37% failed to document the database names and search dates, 62% failed to document the search strategy, 75% did not use several experts to select studies, and 81% did not include all languages [21].

Next, by asking general and broad questions, systematic reviews often produce results and conclusions with questionable validity. Poorly focused questions in systematic reviews lead to unclear decisions about what research to include and how to summarize it. Part of the problem is that some systematic reviews, or the research studies they are based upon, have not accounted for confounders that may preclude appropriate interpretations. Poor systematic reviews will invariably lead to inaccurate conclusions that will then negatively impact upon clinical practice. Further, when systematic reviews are based on randomized clinical trials that are also poorly defined

and directed, the error and impact on clinical practice multiplies.

Limitations of randomized controlled trials

As in other types of prospective studies, randomized clinical trials are susceptible to biases of compliance and long-term attrition. Not all subjects comply with the regimen to which they are assigned, and for studies that require long follow-up periods, there is a natural tendency for a high dropout rate.

Moreover, because it takes such a long time to complete prospective trials, by the time the studies are complete, the appliance and /or procedure that were investigated may not even be considered and/or utilized in practice. Although the goal of conducting high quality randomized clinical trials is noble, the reality is that many clinical research questions are amenable to well-designed and cost-effective, observational (cross-sectional) studies such as cohort or case-control studies.

Also, there are ethical concerns involving randomized clinical trials studies using human subjects. In general, there is the moral foundation that health care providers should not disadvantage subjects on account of their research participation. There must be a genuine uncertainty on behalf of the expert community concerning the merits of each trial arm (clinical equipoise); otherwise, obtaining proper informed consent becomes an issue.

More importantly, when there is no clinical equipoise, there may be an additional ethical concern with randomized clinical trials due to randomization into experimental and control groups whereby subjects in the control group may be disadvantaged significantly by not receiving the more appropriate treatment in the long term (e.g., extraction versus non-extraction, orthodontics versus surgery, and long versus short treatments).

In addition, a researcher cannot ethically create a disease or disorder in one group of subjects, study the effects of the disease (and several treatment

modalities), and compare it with a sample that does not have the disease.

The issue does not really appear to be whether randomized clinical trials are capable of addressing various controversies in dentistry and orthodontics: They are. The issue is whether we can justify the large costs and time associated with such trials when simple, cost-effective retrospective or observational cohort studies may arguably reveal the same results. In a specialty for which only limited research funding is available, we must seek not only evidence but also frugality. Retrospective studies are quick, cost-effective, and ethically unambiguous.

Limitations of meta-analysis

For a meta-analysis, i.e. a mathematical and quantitative (statistical) synthesis of the results of two or more primary studies that address the same hypothesis or topic in the same way, it is important that the methods used for the review are reliable, valid, and well-characterized. Meta-analyses are by all accounts superior to qualitatively based evaluations of numerous studies.

The preliminary aspects of the meta-analysis (prior to applying the actual statistical test), however, are subjective (even though there are certain rules and guidelines); there is the subjective judgment in deciding which studies to include. A number of problems are inherent to meta-analyses: regressions are often nonlinear, effects are often multivariate rather than univariate, coverage can be restricted, bad studies may be included, the data summarized may not be homogeneous, grouping different causal factors may lead to meaningless estimates of effects and the theory-directed approach may obscure discrepancies [22].

Altman [23] believed that the meta-analyses (and systematic reviews) of prognostic studies are difficult. Prognostic studies include clinical studies of variables predictive of future events as well as epidemiological stu-

dies of etiological risk factors. Authors often have concluded that a meaningful meta-analysis for prognostic studies is not possible due to a set of studies being too diverse and/or too weak.

According to Altman [23], the poor quality of the published literature is a strong argument in favor of systematic reviews and an argument against formal meta-analysis.

Meta-analyses are sometimes used incorrectly to recover something from poorly designed studies; studies with insufficient statistical power and studies resulting in apparent contradictions. No statistical test can overcome and rectify the methodological shortcomings of poorly designed primary studies.

In summary, there is no doubt that the meta-analysis has its place in the evidence-based dentistry paradigm and is an integral part of a systematic review; however, the validity of its findings is greatly dependent on the quality of the individual studies incorporated into the analysis.

Keeping all the above limitations in mind, EBD needs to be used wisely, justly, ethically and expertly by all dental professionals. It is after all a tool and any tool can end up getting used poorly with adverse results. EBD must be used to significantly enhance the critical role that dental clinicians play in patient care.

Conclusion

Evidence-based care is a global movement in all the health science disciplines. It represents a philosophical shift in the approach to practice - a shift that emphasizes evidence over opinion and, at the same time, judgment over blind adherence to rules [1].

EBD requires the integration of the best evidence with clinical expertise and patient preferences and, therefore, it informs, but never replaces, clinical judgment [2].

A common misconception is that evidence-based practice is not feasible or is ineffective in the absence of randomized controlled trials. Although

randomized trials are the “gold standard” for judging therapeutic interventions, they may not be available or they may not be the appropriate research design to answer other types of clinical questions. Evidence-based practice is a practical approach to clinical problems. It involves tracking down the best available evidence, assessing its validity and using “rules of evidence” to grade the evidence according to its strength [24].

The fact that scientific research evidence has built the knowledge base and has always provided the foundation for sound practice of the profession of dentistry is not in dis-

pute. However, the context for change, making the practice of EBD possible, is the electronic revolution. The research evidence can now be readily accessed at the “user” level by dentists or patients. Because the quality of research reports and, therefore, the accuracy of the conclusions drawn, vary tremendously, tools are needed to help dentists to properly interpret and apply the evidence [25].

Research works in various branches of dentistry is on the rise in India, mainly by the postgraduate dental students and by the faculties of the various dental colleges; thus there is a need to update their clinical

knowledge to improve their research outcomes. Evidence based dentistry is the solution to provide such updates in order to improve the quality of research in India. There should be an adequate program developed in the form research workshops and seminars on evidence-based dentistry to overcome the barriers perceived by the postgraduates in practice of evidence-based dentistry, thereby integrating this concept into routine clinical practice in order to improve the quality of dental care provided to the patient.

References

- Sutherland SE. The building blocks of evidence-based dentistry. *J Can Dent Assoc* 2000; 66:241-4.
- Sackett D, Richardson W, Rosenberg W, Haynes R. Evidence-based medicine: How to practice and teach EBM. London: Churchill Livingstone; 1997.
- Sackett DL, Rosenberg WM, Gray JA, et al. Evidence based medicine: what it is and what it isn't. *BMJ* 1996;312(7023):71-2.
- Bhargava K and Bhargava D. Evidence based health care - A scientific approach to health care. Sultan Qaboos University Medical Journal 2007;7(2):105-107.
- Lawrence A. Welcome to evidence-based dentistry. *Evidence-Based Dentistry* 1998;1:2-3.
- Earle CC & Weeks JC. Evidence -based medicine: a cup half full or half empty? *American Journal of Medicine* 1999;106:263-264.
- Ring ME. “Founders of a profession: the original subscribers to the first dental journal in the world”. *J Am Coll Dent* 2005;72(2):20-5.
- McCauley HB. “The first dental college: emergence of dentistry as an autonomous profession”. *J Hist Dent* 2003;51(1):41-5.
- Moskowitz EM. Evidence-based dentistry for you and me. *NYSJD* 2009; 48-51.
- Straus SE & McAlister FA. Evidence-based medicine: A commentary on common criticisms. *Canadian Medical Association Journal* 2000;163:837-841.
- Needleman I, Moles DR, Worthington H. Evidence-based periodontology, systematic reviews and research quality. *Periodontol* 2000 2005;37:12-28.
- Sackett DL, Straus SE, Richardson WS, Rosenberg W, Haynes RB. Evidence-based medicine how to practice and teach EBM. New York: Churchill Livingstone, 2000.
- Morimoto T, Fukui T, Lee TH, Matsui K. Application of U.S. guidelines in other countries: aspirin for the primary prevention of cardiovascular events in Japan. *Am J Med* 2004;117:459-468.
- Whiting P, Rutjes AWS, Dinnes J, Reitsma JB, Bossuyt PMM, Kleijnen J. Development and validation of methods for assessing the quality of diagnostic accuracy studies. *Health Technol Assess* 2004;8:1-143.
- Grol R. Successes and failures in the implementation of evidence-based guidelines for clinical practice. *Med Care* 2001;39(Suppl.2):1146-1154.
- Kay EJ, Blinkhorn AS. A qualitative investigation of factors governing dentists' treatment philosophies. *Br Dent J* 1996;80:171-176.
- O'Connor AM, Wennberg JE, Legare F, et al. Toward the 'tipping point': decision aids and informed patient choice. *Health Aff (Mill-wood)* 2007;26:716-725.
- Browman GP. Evidence-based paradigms and opinions in clinical management and cancer research. *Semin Oncol* 1999;26:9-13.
- Bottenberg P, Alaerts M, Keulemans F. A prospective randomized controlled trial of one-bis-GMA based or two ormocer based composite restorative systems in class II cavities: 3 year results. *J Dent* 2007;35:163-171.
- Prabhu S, Saravanan JS. Knowledge, attitude and perceived barriers towards practice of evidence based dentistry among Indian postgraduate dental students. *JDMS* 2012;2(1):46-51.
- Flores-Mir C, Major MP, Major PW. Search and selection methodology of systematic reviews in orthodontics (2000-2004). *Am J Orthod Dentofacial Orthop* 2006; 130:214-217.
- Eysenck HJ. Meta-analysis and its problems. *Br Med J* 1994;309(6957):789-92.
- Altman DG. Systematic reviews in health care systematic reviews of evaluations of prognostic variables. *Br Med J* 2001;323:224-8.
- Sackett DL. Rules of evidence and clinical recommendations for the management of patients. *Can J Cardiol* 1993;9:487-9.
- Glowniak JV, Bushway MK. Computer networks as a medical resource. Accessing and using the internet. *JAMA* 1994;271:1934-9.