

Evidence based dentistry: Why and How?

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Abstract:

The practice of dentistry is becoming more and more complex and challenging. Rapid technical advances, patients as knowledgeable health care consumers, changing socio-demographic patterns and vastness of information; all place greater demands on clinical decision making. To practice in an evidence based manner, practitioners must be able to formulate a clear question, find the best available evidence efficiently, evaluate the evidence systematically and, if it is relevant and credible, apply the results of the appraisal to their practice. In this paper, we give an overview on how evidence based dentistry can be applied in general dental practice.

Keywords: Evidence based medicine, dentistry

Introduction:

As professionals, we dentists try to keep up with the latest information through reading journals and attending continuing dental education courses from time to time. Still, we are left wondering if we should have known more in dealing with specific patient problems. For many of the clinical dilemmas, we are grateful for the network of specialists who can be called for advice and whose opinions are valued. But, we do not always have the opportunity to discuss issues with others and not infrequently, even the experts are uncertain. We must strive to find some other way to address these clinical questions with more precision and confidence and the evidence based approach may just be what we need to that end.

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Role of Evidence-based Dentistry and its application in clinical practice:

The definition of evidence-based practice, “the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients,”¹ suggests that the primary aim and the most valuable application of the evidence-based approach to the practice of 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 problems.”²

Evidence based dentistry can be practiced by obtaining up-to-date scientific information relevant to the specific problem, critically appraise the information and then apply it to solve the clinical situation. This paper discusses the various tools with the help of which the dentist can apply the evidence based approach in clinical practice.

Starting with a Clear Question (clinical problem):

The first step in the quest for answers to a clinical problem (and often the first stumbling block) is the formulation of a clear and focused question — one that is relevant and will help us to carry out a quick and effective search.

Questions often relate to therapy (what technique is most reliable, which material is superior, what drug should I prescribe?), diagnosis (is this test accurate and reliable?), prognosis (what is this patient’s likely clinical course over time, what is the expected longevity of this restoration?) or causation (what is the etiology of this condition, is this treatment harmful?).³

Most often, the original question is too broad. The first step consists of narrowing the question by deciding which elements are the most important to answer with a “hit and run search”. We can look for answers to the less important elements at our leisure, or more likely, when we really need them in the future. When defining

each of the key elements of the question, it helps to be as specific as possible. Finding, evaluating and applying the evidence is key to answering a clinical question.⁴

Efficient literature search:

The ability to conduct efficient literature searches is fundamental to the practice of evidence-based dentistry. A number of excellent and highly specialized databases provide electronic access to medical and scientific literature. By far the most relevant and readily available of these is MEDLINE. This multipurpose database, created and maintained by the United States National Library of Medicine (NLM) of the National Institutes of Health, is an index to the biomedical literature from 1966 onward. Of the over 700 dental journals currently available worldwide, about 320 are indexed in MEDLINE.

The full MEDLINE database is available publicly to anyone, free of charge, via the Internet. The NLM offers free Internet access through 3 Web sites—PubMed,⁵ Internet Grateful Med (IGM)⁶ and the recently launched NLM Gateway⁷. In addition to MEDLINE and PubMed, Gateway also accesses OLDMEDLINE (pre-1966 journal citations), LOCATOR*plus* (books, serial titles and audiovisual resources), meeting abstracts, DIRLINE (a directory of health organizations, research resources and projects) and a number of other valuable databases.

Search Techniques:

MeSH (Medical Subject Headings) is a special vocabulary developed by the NLM to index each reference. Currently, MEDLINE has an entry vocabulary of over 300,000 terms linked to its more than 19,000 MeSH terms. The choice of entry terms is important; we should try to focus the term as much as possible.

Besides searching by subject, searching can be done by “text words,” which are words or phrases in the title or abstract of the article. A useful feature when searching by subject is called

exploding. For example, if the subject term “ceramic restoration” were entered in a database that did not explode the term, only articles dealing with restorations in general would be retrieved.

Another useful operation, called truncation, can be employed when doing text word searches. For example, “dent*” will find all terms that begin with the letters d-e-n-t, including “dental,” “dentistry,” “dentist” and so on. “Mucos*” will find terms such as “mucosal,” “mucosa” and “mucositis.”

MEDLINE provides links to publishers’ Web sites for approximately 800 journals, where full articles can be requested or viewed. In some cases, registration, subscription or some type of fees may be required by the publisher.

In searching for answers to clinical questions, MEDLINE, because of its depth, breadth and continuous maintenance by the NLM, is the best source of evidence for health care. However, other databases and electronic sources are invaluable and offer almost instant access to clinical information⁸.

Searching for Evidence:

Because the quality of information is so variable on the Internet, some criteria have been suggested to assess Internet sites. These include the attributes and affiliations of the authors, the disclosure of funding sources, the regular updating of material, statements or (even better) linked citations leading to supporting evidence, endorsement by respected individuals or organizations, and common sense, coupled with our own experience and expertise.

Best sites that we have found are those produced by academic centers, including university and hospital sites, government-sponsored and professional organization sites and the sites of several medical search engines.

Various academic centers like the Centre for Evidence-Based Dentistry (www.ihs.ox.ac.uk/cebd/) are located at the Institute of Health Sciences, Oxford University, United Kingdom. We will find 2 particularly useful sections: “Evidence-based links” and “Evidence-based tools.” The Health Information Research Unit at McMaster University (<http://hiru.hirunet.mcmaster.ca>) in Hamilton, Ontario, has become internationally famous. The library of the Ottawa General Hospital (www.ottawahospital.on.ca/professionals/library) provides a large collection of links to resources for evidence-based health care.

The National Institutes of Health (NIH) National Library of Medicine databases, particularly MEDLINE via PubMed (<http://www.ncbi.nlm.nih.gov/>) and NLM Gateway <http://gateway.nlm.nih.gov/> are the best government-sponsored and Professional sites⁸.

One of the most extensive collections of guidelines can be found in the National Guideline Clearinghouse (NGC). This database can be accessed through the Web site of the Agency for Healthcare Research and Quality (www.ahrq.gov/clinic/cpgsix.htm) of the U.S. Department of Health and Human Services. A search of the NGC using the term “dentistry” yielded 26 guidelines, 15 of which were developed by or with input from the dental profession. Only 2 of the 15, both of which were done in Canada, used evidence-based methods; the remainder was based on group consensus and expert opinion⁹.

The Canadian Medical Association clinical practice guidelines site (www.cma.ca/cpgs/) provides methodological guidance for the development of guidelines, as well as a handbook on the implementation of guidelines. The German Guidelines Information Service (www.leitlinien.de/gergis.htm) has evaluation criteria, as well as an appraisal instrument to

evaluate the methodological quality of published guidelines¹⁰.

Research Design:

Clinical research can be experimental or observational. In experimental studies, the intervention is under the control of the researcher, whereas in observational studies, the researcher observes patients at a point in time (cross-sectional studies) or over time (longitudinal studies). If the observations are made by looking forward and gathering new data, the study is prospective; if the data already exist (for instance, in dental records or as census data), the studies are retrospective.

Experimental Studies:

Randomized controlled trials (RCTs) are the gold standard by which all clinical research is judged.¹¹ The fact that randomization keeps study groups as similar as possible from the outset, together with other features of the design, such as blinding, sample size justification, appropriate outcome measures and statistical analysis, means that RCTs have the greatest potential to minimize bias. Bias is any factor or process that acts to deviate the results or conclusions of the study away from the truth, causing either an exaggeration or an underestimation of the effects of an intervention.¹²

Randomization of treatment allocation is what makes the RCT one of the simplest and most powerful tools of scientific research.¹³ In any study involving people there are potentially many unknown factors — genetic or lifestyle factors, for example — which can have a bearing on the outcome. Randomization, if done properly, reduces the risk that these unknown factors will be *seriously* unbalanced in the various study groups.

Observational Studies:

RCTs cannot answer all clinical questions. There are situations where they may not be necessary, appropriate, ethical or feasible, or they simply

may not have been done yet. In general, questions of therapy are best answered by RCTs, or even better, meta-analyses if available, whereas questions of diagnosis, prognosis and causation may be best addressed by observational (sometimes called “epidemiological”) studies. Observational studies, which are frequently undertaken in dentistry, can be even more challenging to design and execute, in terms of controlling bias. Therefore, it is very important to use critical appraisal methods to assess the validity of these studies.¹⁴

Assessment of Data:

Critical appraisal can be used to rapidly assess and discard reports of research studies that are irrelevant or of poor quality. Randomized clinical trials and systematic reviews are tools which can be used to critically appraise the papers according to the type of clinical question they address.

Systematic Reviews:

Evidence based dentistry’s foundation is laid by a systematic literature review approach, which differs significantly from the narrative review. Narrative reviews are broad in scope, written by experts, which are often informal and subjective, and supporting author’s views. Different conclusions may be derived from different reviews. They provide a general perspective on a topic. Their selection of studies is subject to bias and overall conclusion may not be accurate.¹¹

When considering a new therapeutic or preventive intervention, common sense dictates that the highest levels of evidence — randomized controlled trials (RCTs) and systematic reviews — should be sought before subjecting patients to possibly useless, and perhaps even harmful, treatments. The RCT is the strongest design for a clinical study because randomization of patients to the comparison groups minimizes bias by ensuring that the patients in each group are as similar as possible in all respects, except for the treatment under investigation.

As more RCTs studying a particular question become available, it is more difficult for the reader to process and synthesize all of the information to find the answer to a clinical question. Systematic reviews (sometimes called “secondary” publications or integrative research) summarize, analyze and report the combined results of a number of RCTs. They are done with the same rigor that is expected of primary studies, but the “unit of analysis” is the individual study rather than the individual patient.

For example when considering a systemic review for a new diagnostic test, it is important to remember that tests are rarely 100% accurate; there will be false positives and false negatives with any test. The best tests are the ones that are good at detecting most of the people with the condition (high sensitivity) and at excluding people who don’t have the condition (high specificity). The most useful tests help to establish an accurate diagnosis, which supports the most appropriate treatment leading to the best outcome for the patient.

The Cochrane Collaboration is an international nonprofit organization whose overall aim is to build and maintain a database of up-to-date systematic reviews of randomized controlled trials of health care and to make these readily accessible electronically. The history of the Cochrane Collaboration dates back to the influential 1972 publication, *Effectiveness and Efficiency*,¹⁵ by the British physician/epidemiologist Archie Cochrane. In this essay, Cochrane emphasized the use of scientific evidence, rather than intuition, expert opinion, anecdotal experience or tradition, in the evaluation of health care. British National Health Service created the Cochrane Centre, at Oxford, UK, named in honor of Archie Cochrane, to facilitate the preparation and maintenance of systematic reviews for all areas of health care. Tremendous international interest followed and by 1993, centers had been established in Denmark, Canada, the United States and

Australia. There are now fifteen Cochrane Centers worldwide.¹⁶

The Cochrane Oral Health Group is based at the University of Manchester, UK. It has produced some systematic reviews. Their web site (<http://hiru.mcmaster.ca/cochrane/default/htm>) is an excellent place to see what the evidence based dental practice in the future will be like.¹⁷

Conclusion:

Modern day dentistry presents great challenges to the practicing dentist to deliver care of the highest standard to patients. At times there are situations where the clinician is confronted with doubts regarding diagnosis and treatment planning in spite of the knowledge and experience gained over time. Further, unprecedented advances in electronic technology, information explosion and the consumer movement with increasingly well-informed patients taking part in the clinical decision-making process, all contribute to the need for dentists to meet the challenge and enjoy the opportunities of practicing evidence-based dentistry. A paradigm shift in clinical practice from the traditional approach to the evidence based approach is the need of the hour. It is critical for dentists to familiarize themselves to the methods of applying the tools of evidence based dentistry which have been discussed.

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