The Building Blocks of Evidence-based Dentistry

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Abstract

The practice of dentistry is becoming more complex and challenging. Changing socio-demographic patterns, patients as knowledgeable health care consumers, rapid technical advances and the information "explosion" all place greater demands on clinical decision making. The need for reliable information and the electronic revolution have come together to allow the "paradigm shift" towards evidence-based health care to progress swiftly. Evidence-based dentistry closes the gap between clinical research and real world dental practice and provides dentists with powerful tools to interpret and apply research findings. Central to evidence-based practice is the systematic literature review, which synthesizes the best evidence and provides the basis for clinical practice guidelines.

MeSH Key Words: dentistry; evidence-based medicine

The Evidence-based Paradigm

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, judgement overblind adherence to rules. This approach provides a bridge between research and everyday patient care.

Evidence-based practice is "the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients."8 It is a process which expresses a clinical problem as a question, employs a systematic framework to locate and evaluate relevant research and...
integrates that information with clinical experience to guide clinical decisions.2

In understanding the concept of EBD, it is helpful to clarify what it is not. It is not a “cookbook” approach to practice. EBD requires the integration of the best evidence with clinical expertise and patient preferences and, therefore, it informs, but never replaces, clinical judgement.3 Evidence-based health care recognizes the complex environment in which clinical decisions are made and the importance of individual patient circumstances, beliefs, attitudes and values.4

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.5

EBD is not an ivory tower endeavour for armchair academicians. Rather, it is the domain of practising dentists. Although many of the skills for literature searching and critical appraisal have not been taught in the past in traditional programs, most medical and dental faculties are now including the concepts of evidence-based practice in their curricula. There is an increasing body of literature to assist practising clinicians in the acquisition of the skills needed to use evidence to guide practice. It has been shown that evidence-based methods can be learned by clinicians of varying backgrounds, at any stage in their careers.6

Finally, evidence-based practice is not “old hat,” which everyone already uses in day-to-day practice. 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 dispute. However, the context for change, and what has made 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. The “information explosion” and the limited amount of time for keeping up with the literature has made the evidence-based approach valuable and effective for efficiently filtering what is truly important for clinical decision making from what is not.7

Systematic Reviews

The foundation for the evidence-based approach is the systematic literature review, which differs significantly from the narrative review. Narrative reviews (the traditional review article) are usually broad in scope, written by experts and are often informal and subjective, supporting the author's views. Reviews by different authorities may arrive at different conclusions, leaving the reader wondering what the “truth” really is. While narrative reviews are useful for providing a general perspective on a topic and are appropriate for describing the history of a problem or its management,8 their selection of studies is subject to bias and the overall conclusions may not be accurate.

Systematic reviews use explicit standards for evidence retrieval, assessment and synthesis. They are undertaken with the same rigour as one expects from the primary research, with each study in the review treated as a “unit of analysis,” using specific eligibility criteria for its inclusion.9 The methodology of the review is thoroughly documented and reproducible. The strengths of systematic reviews include a clearly defined question, a comprehensive search strategy, explicit inclusion criteria, assessment of methodological quality of the included studies, synthesis of the data and a summary of the results.

The question driving the review should be focused.10 A “well-built” question11 will include four key elements: the population (for example, children in the primary dentition stage), the condition of interest (such as posterior crossbite), an exposure to a test or intervention (occlusal grinding to remove premature contacts) and a specific outcome (posterior crossbite in the permanent dentition). An example of a clear clinical question might be “Does removal of premature contacts by occlusal grinding of the primary teeth prevent posterior crossbite in the permanent dentition?”

When the results of two or more studies can be combined statistically, the review is called a quantitative systematic review or meta-analysis. Using this technique, statistical analysis of the results of multiple studies is done to obtain a single estimate of effect, leading to greater precision of the estimate and increased statistical power to detect the true effect of an intervention in the face of conflicting results.12 It is not always possible or sensible to include a statistical analysis in a systematic review. Controlled clinical trials may not have been done, may be of poor quality or may be too different from each other in terms of the population studied, the intervention used or the outcome which was measured. When the results cannot be statistically combined, but still use rigorous scientific methods to minimize bias, the review is called a qualitative systematic review. This type of systematic review is highly valuable for summarizing the existing data, for helping us to understand discrepancies in the available evidence, for informing us of the lack of reliable studies and in helping to define future research strategies.

The term “overview” is often used to describe a systematic review, whether it is qualitative or quantitative. The preparation of a systematic review is a major undertaking, requiring considerable time and expertise.

The Cochrane Collaboration

The Cochrane Collaboration is an international 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. It has been called “an enterprise that rivals the Human Genome Project in its potential implications for modern
Clinical Practice Guidelines

Clinical Practice Guidelines (CPGs) are “systematically developed statements to assist practitioners and patients in arriving at decisions on appropriate health care for specific clinical circumstances.” The overriding purpose of guidelines is to enhance, not dictate, clinical decision making and to provide practical recommendations to help practitioners improve the care they offer to their patients.

Different approaches have been used to develop guidelines, including expert opinion, group consensus and evidence-based methods. Although experts may have a wealth of scientific knowledge, clinical experience and credibility, guidelines based on expert opinion are usually unstructured and informal, and are open to criticisms of bias and conflict of interest.

Guidelines derived from consensus meetings are more structured and formal. They represent the views of various stakeholders and may be useful for creating uniform practice policies, particularly in areas of controversy. However, the research considered may represent a biased sampling and the evidence is generally not available for scrutiny. Furthermore, it is in areas of clinical controversy that the evidence-based approach is most useful in assessing the evidence and identifying weaknesses.

Evidence-based clinical practice guidelines (EB-CPGs) are structured and formal, and use rigorous, explicit and reproducible methods to assemble and evaluate the evidence. These guidelines are based on systematic reviews and incorporate values and preferences of patients and practitioners. The process of creating a well-developed EB-CPG includes external review and comment by those who will be using the guidelines — for example, a wide range of clinicians, as well as patients or their representatives.

The development of EB-CPGs in dentistry is in the beginning stages. A review in 1995 of guideline development by various dental organizations and specialties in the United States revealed a lack of systematic analysis of the literature and a reliance on expert opinion acquired through unstructured and untested methods of consensus. Since that time, a number of initiatives have been undertaken. In Canada, in 1997, the Canadian Dental Association sponsored a Workshop on Clinical Practice Guidelines, where one of the objectives was to begin to develop a collaborative approach to guideline development and implementation over the next five years. This led to the initial meeting of the Canadian Collaboration on Clinical Practice Guidelines in Dentistry (CCCD) in October, 1999. The collaboration, as the national, autonomous body responsible for EB-CPG development, will have broad representation from the dental profession. The planned structure incorporates administrative and methodological support and embraces the principles of evidence-based practice and sound guideline development.

There are many challenges in implementing evidence-based practice, producing high-quality systematic reviews and developing useful evidence-based guidelines. Barriers to using evidence-based methods in everyday practice include lack of appropriate skills for formulating clear questions, executing efficient electronic searches and evaluating the literature; however, these skills can be learned by anyone, at any stage of practice. What is needed is a desire and a commitment to implement this type of practice and practical, accessible CE programs and workshops in this regard. Our dental faculties and professional organizations should be the leaders in these endeavours. The practice of EBD is thought by some to be too time-consuming. As with any new skill, there is a learning curve to overcome and with experience, fuzzy clinical
problems will quickly become focused questions and the best
evidence can then be tracked down efficiently.

Often cited as a barrier to EBD is the lack of good clinical
research in the form of well-designed, adequately powered
randomized trials. The rigorous methodology demanded by
systematic reviews for organizing and analyzing the literature
in an area provides a valuable tool for identifying areas where
the evidence is weak and where research is needed and feasible.
Overviews should be part of the development of future
research agendas and, in fact, the presence of a prior systematic
review will likely influence research funding decisions in the
future (L. O'Toole, UK Medical Research Council, speaking at
the 6th Cochrane Colloquium, October 1998).

Perhaps the greatest impediments to the evidence-based
movement are the fear and mistrust on the part of practitioners
that the evidence will be misused by decision makers, particu-
larly third-party funders and regulatory bodies, and that the
individual autonomy of dentists, in caring for their patients,
will be threatened. Clearly, research evidence can be abused by
anyone — dentists, patients, politicians, policy makers and funder
— who selectively choose the evidence to support and promote
their own views. This is another compelling reason why the
profession must embrace EBD and provide the leadership
needed to protect the scientific integrity of the evidence.
Practising dentists must ensure, through direct involvement
with the process, that guideline development methods are
open and transparent and that the resulting guidelines are
practical, useful and relevant.

Overcoming these barriers, exploiting the potential of
information technology and applying sound scientific prin-
ciples to everyday practice will allow dentists to meet the greatest
challenge of practice — the provision of high quality, effective
oral health care.

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