Evidence-based dental care—a concept review

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Abstract

Evidence-based (science-based) care is the prevailing paradigm in the health sciences. This paper briefly reviews the basic concepts of evidence-based care. Assessment of scientific evidence including information retrieval, evaluation of the quality of evidence, and finally the synthesis of collected evidence is described. Practitioner approach to evidence-based care through the twin modalities of literature reviews and clinical practice guidelines is outlined. It is concluded that the promotion of outcomes research and the adoption of evidence-based practice is likely to improve the delivery of a high standard of quality dental care.(Pediatr Dent 20:418–421, 1998)

A new approach to the practice of health sciences has developed recently. This new paradigm has been labelled as the evidence-based (or science-based) approach and "de-emphasizes intuition, unsystematic clinical experience, and pathophysiologic rationale as sufficient grounds for clinical decision making and stresses the examination of evidence from clinical research."[1] As the medical sciences move towards adopting this new philosophy, it is of utmost concern that "advancement of dentistry as a clinical science has been hampered by a failure to practice evidence-based care, which incorporates principles derived from clinical epidemiology."[2] Bader and Shugars[3] in 1995 made the following valid though acerbic comment upon the quality of information based on which dentistry is practiced. They observed that "information which a lay observer might assume to be the very bedrock of the dental profession all too often resembles quicksand."[3] The poignant situation of the dental practitioners was highlighted by the Reader's Digest special report "How honest are dentists?" in the February, 1997, issue of this widely read magazine in the popular press.[4] The article noted that "dentistry is a stunningly inexact science."[4] It is therefore becoming increasingly clear in this "age of Information" that investigative journalism and consumer activism render all clinical decision-making subject to external scrutiny rather than to just professional or peer-review as in the past. It is incumbent, therefore, that dental practitioners deliver care that will withstand external scientific review as apparently evidence-based care is here to stay rather than be just a passing fad of the day.

The stimulus for this philosophical change has been generated by the accumulation of scientific knowledge combined with efforts at cost containment while providing a high standard of care.[5] Clinicians' dilemma at these recent developments is becoming manifest as most practitioners have been trained in the old school of thought. This has led to a lack of enthusiasm from the practicing community based more on ignorance rather than resistance. There is, therefore, a need to apprise current practitioners on the new method of thinking. Simultaneously academic institutions need to develop curricula based on the new paradigm thereby creating an ever increasing number of practitioners schooled in evidence-based practice. The objective of this literature review is to briefly apprise clinical practitioners on the basic concepts of evidence-based (or science-based) care.

The past

The previous paradigm relied upon:

1. Unsystematic clinical observations to establish and maintain knowledge about prognosis and treatment efficacy
2. Understanding of the basic disease mechanism and pathophysiologic principles as sufficient guide for clinical practice
3. Traditional training and common sense as adequate to evaluate new therapies.[1]

Traditionally, clinicians have responded to clinical problems through one of the following approaches:

1. Own clinical experience
2. Knowledge of underlying biology
3. Refer to a textbook
4. Seek the opinion of "experts."[1]

The future

The new approach implies that clinicians should regularly consult the original scientific literature in

solving clinical problems with the assumption that this would allow them to provide optimal patient care.[1] The process has been referred to as the "critical appraisal exercise" and includes:

1. Precise definition of patient problems to facilitate efficient literature search
2. Understanding rules of evidence to interpret lit erature regarding causation, prognosis and thera peutic approaches
3. Extraction of the clinical message and applica tion to the patient problem.[1]

"The evidence-based care paradigm implies that clinicians must regularly update their knowledge base by actively and critically digesting new scientific literature."[2] Assessment of scientific evidence consists of three steps: firstly, the retrieval of evidence; secondly, the evaluation of individual studies for the quality of evidence and finally, the synthesis of the combined evidence from multiple studies to make conclusions about the evidence on a particular topic.[6]

Information retrieval

Practitioners can access computerized bibliographic database such as MEDLINE for references either online via the Internet or in a CD-ROM format. The National Library of Medicine can be accessed for a MEDLINE search at the following website address—http://www.nlm.nih.gov. Medical Subject Headings (MeSH), textword or authors' names can be used for accessing the references. The time interval of the search as well as the language of publication can be specified. Once a list of references is generated from the MEDLINE search, the references cited in each individual article thus obtained can be reviewed to obtain scientific articles missed in the initial MEDLINE search. Clinical practice guidelines and other information on pertinent topics can also be obtained from professional dental societies. The American Dental Association can be accessed at its website at the following ADA ONLINE Internet address - http://www.ada.org. The American Academy of Pediatric Dentistry can be accessed at its website at the following address - http://www.aapd.org.

Evaluation of the quality of evidence

Evidence-based Medicine Working Group have provided simple criteria for assessing diagnostic and therapeutic studies.[7] The criteria for assessing diagnostic studies were:

1. Was there an independent, blind comparison with a reference standard ?
2. Did the patient sample include an appropriate spectrum of the sort of patients to whom the diagnostic test will be applied in clinical practice?[7]

The criteria for assessing therapeutic studies were:

1. Was the assignment of patients to treatments randomized?
2. Were all of the patients who entered the trial properly accounted for and attributed at its conclusion?

The use of randomized clinical trials to determine the efficacy of drugs, surgical therapies, and diagnostic tests is becoming the standard.[1] Therefore, the collected evidence must be classified using the following hierarchical quality of evidence:

1. Evidence obtained from at least one properly randomized controlled trial

2a. Evidence obtained from well-designed controlled trials without randomization

2b. Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group

2c. Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments could also be included in this category

3. Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.[8]

Synthesis of evidence:

Meta-analysis is becoming established as the method for summarizing the results of numerous randomized trials.[1] Following the synthesis of the evidence, the conclusions must be classified as follows:

1. Good evidence to support a recommendation for use
2. Fair evidence to support a recommendation for use
3. Poor evidence to support a recommendation for use
4. Fair evidence to support a recommendation against use
5. Good evidence to support a recommendation against use.[8]

Practitioner approach to evidence-based care

This change in clinical practice philosophy occurs at a time when clinicians are confronted with exploding volume of literature, rapid introduction of new technologies, and concern about increasing health care expenditures with an ever increasing emphasis on quality and outcomes of health care.[7] The rapidly increasing and overwhelming amount of scientific literature can be daunting to practitioners who want to remain

abreast of current knowledge and provide evidence-based high quality and latest dental care. This dilemma can be resolved either through literature reviews or clinical practice guidelines.

Literature reviews

Literature reviews are an efficient method of updating scientific information on a particular topic. However the information contained and the conclusions made in a literature review are qualitatively only as valid as the method of information retrieval and the synthesis of information from multiple studies to provide the conclusions. Guidelines have been provided for assessment of research reviews as follows:

1. Define the question
2. Define the methods to locate relevant studies
3. Specify explicit methods to determine which articles to include in the review
4. Determine validity of primary studies assessed
5. Ensures assessment of the primary studies reproducible and free from bias by at least two researchers, each blind to the other's decision and the extent of agreement should be recorded (Intraclass correlation coefficient, Kappa statistic)
6. Ensures the variation in the findings of the relevant studies analysed
7. Confirms the findings of the primary studies combined appropriately (Meta-analysis)
8. Verify the reviewers' conclusion supported by the data cited.[9]

Literature reviews may not always be available on a particular topic of interest to the practitioner or the clinical problem might require a complex interplay of diagnostic and therapeutic modalities. Under these circumstances, practitioners can look to clinical practice guidelines as a resource.

Clinical practice guidelines:

"Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances."[10] There has developed a need for clinical practice guidelines due to rapid expansion of scientific knowledge, increasing awareness of practice variation and finally expanding commitment to quality improvement.[11] The objectives of clinical practice guidelines are to reduce inappropriate care, improve patient outcomes, reduce health care costs, enhance quality assurance and improve medical education.[6] Evidence-based guidelines consist of recommendations based on scientific evidence of effectiveness with an emphasis on rules of evidence over expert opinion.[6]

Clinical practice guidelines are usually developed by professional bodies. They should be developed in an explicit and transparent manner. The sequential approach to the development of a clinical practice guideline for the management of a clinical problem should be as follows:

1. Formulate the question
2. Locate, evaluate and synthesize the evidence
3. Estimate the expected benefits, harms and costs for each option
4. Judge the relative value of the expected benefits, harms and costs
5. Apply clinical practice guidelines.[12]

It has been noted that "valid and influential guidelines could facilitate more consistent, effective and efficient medical care and ultimately lead to improved outcomes for patients."[10] Some clinicians have expressed concern that clinical practice guidelines "devalue" the "art of medicine" and threaten "clinical autonomy."[13] However, "evidence from the peer-reviewed literature suggests that the implementation of guidelines can improve the quality of patient care."[13] Further, it must be borne in mind that clinical practice guidelines have a "shelf life" due to constant change in medical knowledge and practice environment.[12] They should therefore be reviewed at regular intervals.[12]

Conclusions

Dentistry needs to make strides to keep pace with the prevailing paradigm of evidence-based care. There is a strong "need for the science behind our treatment decisions."[14] However, "direct application of the evidence-based health care approach will be limited to some extent when there is inadequate evidence."[15] Research in outcomes assessment in dentistry is an exigency that must be immediately addressed. Outcomes assessment is a process that involves the collection and analysis of data to determine the results produced by a specific procedure or treatment regimen.[16] Outcomes assessment is an important tool in the process of utilizing science to advance clinical practice.[16] Practice-based networks utilizing the resources of both the academic and practicing communities in a collaborative manner represent a promising approach towards advancement of outcomes research.[16] The promotion of outcomes research with the consequent accumulation of scientific evidence and the adoption of evidence-based practice is likely to improve the delivery of a high standard of quality dental care in the coming years.

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