

Evidence-based Dental Practice: Critical Appraisal of the Literature

Evidence-based dentistry involves defining a question focused on a patient-related problem and searching for reliable evidence to provide an answer. Once potential evidence has been found, it is necessary to determine whether the information is credible and whether it is useful in your practice. This article discusses the concept of critical appraisal of the literature, the relevance and validity of research findings and tools for selecting the most appropriate therapy for clinical dental practice.

The ability to make a sound clinical decision is largely based on the quality of evidence that supports an accepted clinical practice and practitioner's ability to evaluate this evidence with regards to benefit, risks and appropriateness of the treatment options. Other factors that influence clinical decision making (for example, experience with similar therapeutic situations and the practitioner's level of clinical training) are important, but they heavily rest on the cumulative knowledge base that is integrated by the clinician when arriving at a decision.

Evidence-based dentistry involves defining a question focused on a patient-related problem and searching for reliable evidence to provide an answer. Once potential evidence has been found, it is necessary to determine whether the information is credible and whether it is useful in one's practice by using the technique of critical appraisal. Once a research finding has been published, especially in respected peer-reviewed journals, it achieves a certain level of respectability and credibility. However, methodological research has shown that acceptance of the findings of many published studies is not always deserved. Hence, the need for critical appraisal of published evidence. Critical appraisal of the literature assists the reader in assessing the validity (closeness to the truth) and the relevance (applicability and usefulness in everyday practice) of research findings.

Once clinical evidence has been found in the literature, the clinician needs to decide if the results are believable and whether the findings can be applied to his/her patient. Assessing the *validity* and the *relevance* (can I apply the findings in my practice?) of research findings is as important as searching for answers to clinical questions. As part of critical appraisal of the evidence, there is also a need to continually re-evaluate generally accepted clinical practices in light of emerging evidence and to base therapeutic decisions on the best available evidence, not to rely solely on expert opinion or the longevity of a clinical practice. Persistence of a therapeutic approach that has been documented to be ineffective or unsafe is an irrational clinical practice. For example, proneness of the mandibular angle to fracture in the presence of impacted lower third molars (ILTM) has long been a strong point for prophylactic removal of lower wisdom teeth, especially in adolescents and young adults who frequently play contact sports. In fact, there is incontrovertible evidence in the literature regarding the proneness of mandibular angle to being fractured in the presence of impacted lower third molars. One mechanism by which third molars have been hypothesized to increase the risk of angle fractures is by occupying osseous space and, thereby, weakening the angle region by decreasing the cross-sectional area of bone. However, recent emerging evidence suggests that the presence of incompletely erupted mandibular third molars diminished the incidence of condyle fractures. These recent findings suggest that when the mandible is traumatically injured in the absence of ILTM, more force is transmitted to the condylar region; and there is increased incidence of associated condylar fractures. What are the implications of the recent findings regarding the proneness of mandibular condyles being fractured in the absence of ILTMs to us as surgeons and health care providers? In terms of patients' care, mandibular angle fractures are easily accessible, and excellent reduction and stable fixation are easily performed with minimal postoperative complications. On the other hand, most surgeons would agree that condylar fracture is one of the most difficult to treat in the maxillofacial region, and may be associated with malocclusion and facial nerve injury. Condylar fractures are usually more severe, are more difficult to treat, and have greater risk of long lasting complications than angle fractures. Is it appropriate to strengthen the mandibular angle region and to make the mandible more vulnerable to condylar fractures by means of removing an asymptomatic ILTM? Therefore, in the light of the emerging evidence, prophylactic removal of asymptomatic ILTM may not be beneficial as a means for reducing the chances of angle fracture in those patients at risk of maxillofacial trauma.

Critical Appraisal of the Literature

The first step in critical appraisal of the research findings is to critically assess the origin/source of the information. If it is a journal, is it a peer-reviewed journal? Does the journal belong to a reputable academic or association, postgraduate medical college, or university? Most of the reputable dental journals belong to one of the above mentioned institutions. For example, Journal of Oral and Maxillofacial Surgery is the official journal of the American Association of Oral and Maxillofacial Surgeons (AAOMS), while International Journal of Paediatric Dentistry is the official journal of the British Society of Paediatric Dentistry (BSPD) and the International Association of Paediatric Dentistry (IAPD).

If it is a web-based source, is it a well recognized reputable source? Is the source regularly updated? Several academic centre sites generally feature many useful resources. These include not only ways to find valid, up-to-date clinical information, but also tools to help clinicians to learn to practice evidence-based care and to teach it to others. A good example of a well respected regularly updated web-based evidence-based source in medicine and dentistry is Cochrane Collaboration (www.cochrane.org).

Questions Relating to Therapy

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.

Critical Appraisal of Randomized controlled trials (RCTs)

The following guidelines (questions) have been developed to assess the validity and the importance of a study about a treatment or a preventive intervention:

-Was the allocation of patients to study group random? Randomization ensures that treatment and control groups are similar at the outset and that differences at the end of the trial are due to the intervention and not to some “selection” factor.

-Were all the patients who entered the trial accounted for and analyzed at the end of the study? Generally, follow-up of less than 80% of the patients enrolled at the beginning of the trial is considered unacceptable. It is also important that patients be analyzed in the group to which they were originally randomly allocated, even if they switched groups or were noncompliant with either the experimental or the control treatment. This is the intention to treat principle and it serves to preserve the powerful function of randomization. This consistency prevents the intervention from appearing to be effective when it is not.

-Were patients, clinicians and study personnel “blinded”? The greater the extent of blinding of all personnel, the more rigorous the trial.

-Were the groups similar at the outset and treated equally throughout the study? The investigators should present baseline data on all patients in each group and if there are significant differences, assure the reader that these differences were adjusted for in the statistical analysis.

-Were clinically important outcomes assessed? Evidence-based practice is about making clinical decisions, so a clinically important outcome is one that is important to the patient. For example, a carious tooth that requires treatment is important to a patient; a cariogenic bacteria count generally is not. Mobility and loss of teeth are important to patients; radiographic measurements of bone loss are not. Microbiological and radiographic end points are “surrogate” or secondary end points, not primary clinical ones.

-Can the results of the study be applied to my patients? If the results can be generalized to your patients, it is important to consider if the benefit is greater than any potential harm, added cost or inconvenience.