

Reflections on a Decade of Evidence-Based Dentistry

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The need to communicate current research findings of the highest level more effectively is becoming imperative in influencing clinical practice in the 21st century. In 1998 a research paper published in *Lancet* set off a firestorm of reactions whose damaging effects are still being felt today. The paper suggested a link between a greater risk of autism and the combined measles, mumps, and rubella vaccine routinely given to children. Finally, some parents had an answer to the mystery of why their children were afflicted by the disorder. However, we now know it wasn't the *right* answer (Wakefield et al. 1998).

Lancet has now retracted the 1998 paper, saying the lead author had been dishonest, violated research rules, and had subjected the 12 children involved with his study to needless suffering and procedures such as lumbar punctures and colonoscopies (Murch 2004). Dr. Andrew Wakefield recommended that the combined vaccine be split into three separate shots. But he didn't disclose that a year earlier he had patented a measles vaccine that could be used if the combined vaccine were discredited. Nor did he disclose that his research was partly funded by lawyers of parents seeking to sue vaccine makers.

Despite the retraction by *Lancet*, much damage has been done—and cannot be undone. Now, even though study after study has found no link between vaccination and autism, many parents are still more willing to believe the one, small, now-discredited study that supposedly did find an associated risk. Parents continue to give credence to the discredited *Lancet* study, and because of this, children's lives are endangered. Early and more effective communication with the public at large was needed in this case in support of childhood immunization.

With the publication of this text, I find it satisfying to realize how rapidly change in this area has been occurring. Several years ago (2003), while working on an editorial, I typed “evidence-based dentistry” into the PubMed database and got back nothing, a big zero, “no items found” (Turpin 2003). In 2010 the same question was answered with “2287 items found.” Fortunately, a number of people in dentistry are true believers in evidence-based research, and for this I am thankful. With early encouragement from Michael G. Newman, editor of the *Journal of Evidence-Based Dental Practice*, Mosby, Inc. sponsored the First International Conference on Evidence-Based Dentistry in Atlanta in 2003. This conference allowed those with experience in this new methodology to describe how to implement an evidence-based decision-making approach in everyday practice. This conference has become a landmark meeting that deserves credit for bringing together a wide range of sponsors, partners, researchers, educators, attorneys, and clinicians. The goals of the conference were as follows:

- Provide a venue for an accomplished group of international speakers to discuss a broad range of topics associated with the methods and outcomes of evidence-based initiatives and programs.
- Provide a context for, and examples of, cutting-edge evidence-based methodologies, skills, and research.
- Critically examine barriers and resistance to the evidence-based paradigm.
- Begin the process of culture change in education and clinical practice.
- Enhance networking and formation of new alliances and partnerships among attendees.

Since that time, the American Dental Association has been a strong proponent of multidisciplinary efforts to improve product assessment methods and advocates for the proper evaluation and use of the best available evidence in clinical practice. Following its lead in 2005, the American Association of Orthodontics adopted an official definition of evidence-based dentistry for the clinical practice of orthodontics.

Evidence-based dentistry (EBD) is an approach to oral health care that requires the judicious 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. (AAO House 2005 Resolutions)

This process integrates the best research evidence, clinical expertise, and the patient’s treatment needs—three critical components in evidence-based practice. You can determine the best treatment and have the ability to complete it, but without patient acceptance, it doesn’t matter. The situation is different when a patient agrees to have a procedure, but the evidence does not support it. If the procedure is new or the research is incomplete, use of the best evidence might not be an option. What if several systematic reviews state that the procedure is unacceptable for correcting the problem and better alternatives are available? According to the rules of evidence-based practice, you should tell the patient. Mindful of this potential dilemma, the AAO House of Delegates charged the AAO and its Council on Scientific Affairs (COSA) to identify systematic reviews and meta-analyses on various orthodontic topics. Summaries of the findings provide a wealth of information for the practicing orthodontist.

The next time you examine an adult patient who asks what can be done to “cure” snoring and problems related to obstructive sleep apnea, you may want to know more about this subject. Take a look at the Cochrane Collaboration review of the topic.

Sleep apnea is characterized by recurrent episodes of partial or complete upper airway obstruction during sleep, leading to a variety of symptoms including excessive daytime sleepiness. The current first choice therapy is continuous positive airway pressure that keeps the upper airway patent during sleep. However, this treatment can be difficult for patients to tolerate and comply with on a long-term basis. Oral appliances have been proposed as an alternative to continuous positive pressure therapy. They keep the upper airway open by advancing the lower jaw forward or keeping the mouth open during sleep. This review found insufficient evidence to recommend oral appliances as first choice therapy for sleep apnea. When an active oral appliance was compared with an inactive oral appliance, there were improvements in daytime sleepiness and apnea/hypopnea severity. However, oral appliances proved less successful than continuous positive pressure in decreasing sleep disordered breathing. When an oral appliance was effective in treating sleep apnea, it was preferred to continuous positive pressure by some patients. Oral appliances may be more effective than corrective upper airway surgery. (Lim et al. 2004)

Another Cochrane systematic review questions the effectiveness of penicillin to guard against bacterial endocarditis before an invasive dental procedure.

There is no evidence about whether penicillin prophylaxis is effective or ineffective against bacterial endocarditis in people at risk who are about to undergo an invasive dental procedure. There is a lack of evidence to support published guidelines in this area. It is not clear whether the potential harms and costs of penicillin administration outweigh any beneficial effect. Ethically, practitioners need to discuss the potential benefits and harms of antibiotic prophylaxis with their patients and their cardiologists before a decision is made about administration (Oliver, Roberts & Hooper 2004).

But as technology continues to advance, the number of treatment options available can overwhelm the public, as well as many in the professional community. It is no surprise when patients become frustrated with the decision-making process. Who should deliver their care? At what age should it be started? Will braces be required, or can removable aligners do the job? Can orthodontic treatment be accomplished without jaw surgery? As a specialty, it is time to ask these questions. Do we know how to predictably prevent, manage, and treat malocclusions, with all their manifestations, efficiently and with the best possible outcomes? If the answer is yes, based on the best available evidence, is it not appropriate to write guidelines for the management and correction of malocclusions? Realistically, ours might be the only specialty in dentistry that has not already produced true practice guidelines for the standard of care. The American Academy of Periodontology has been writing guidelines for years and recently began developing new guidelines for managing patients with periodontitis (<http://www.perio.org>; Greenwall 2001). These guidelines are directed at defining levels of care appropriate for the general dentist. A more urgent need in our specialty might be the development of guidelines for the treatment of malocclusions by orthodontic specialists. In periodontology, it is the academy's hope that the latest guidelines will help improve the periodontal health of all patients with periodontitis. Evidence suggests that more patients would benefit from periodontal specialty care. Can we as a specialty learn from their experience?

Improving the quality of care with practice guidelines might mean challenging the beliefs that each patient is unique and that doctors must bring an individualized approach or plan of treatment to each patient. According to physician Dr Loren H. Roth (Gleckman & Carey 2006), quoted in a recent *Business Week* article, most illnesses and injuries can best be treated by standardized care. This idea horrifies most clinicians.

The vast differences in the way temporomandibular discrepancies (TMDs) are diagnosed and treated is a case in point. Some orthodontists claim that with fixed appliances they can make the occlusion perfect and solve TMD problems. The evidence now shows that some procedures are invasive and irreversible and might be inappropriate at best. Yet many dentists still believe that occlusion is the primary cause of TMD. It is no surprise that the world of TMD and orofacial pain is rife with differences of opinion based on “viewpoint” articles and case reports but not on the evidence.

Some in the profession are concerned about the misuse of guidelines by insurance companies. Although this is not a new threat, insurance companies have given the public the impression that they define the parameters of care by their regulations and coverage, even though their decisions might be contrary to evidence from well-designed, peer-reviewed studies and patient preferences. In evidence-based dentistry, there is a “conscientious, explicit and judicious use of the current best evidence” to be used in clinical decision making. This information is an adjunct, not a substitute, for clinical judgment and patient preference. When used in concert, it can provide optimal treatment. Back to our original premise: are we as a specialty ready to begin the long process of writing guidelines for the management and correction of malocclusions? Orthodontic guidelines can be found now on various websites, but few of these guidelines were written or endorsed by the American Association of Orthodontists (American Academy of Pediatric Dentistry Clinical Affairs Committee 2006)!

As the issue of who is best qualified to deliver specialty care continues to percolate throughout society, it becomes more critical than ever before to specify which procedures lead to the best treatment outcomes. Although most academics knowledgeable about evidence-based practice believe that we might never have high-level evidence for more than 50% of the procedures we currently use, we must strive to make use of what is well known by the research community. For instance, we know a great deal about the stability of orthodontic treatment, and this information is becoming more available to our members as well as the public. Take a minute to look at The Cochrane Library, and you’ll find a location titled, “Resources for journalists and bloggers” (Lentini-Oliveira et al. 2009). What do you think you will learn about the stability of open bite closure as a result of early treatment? It might be time for our specialty to define which treatment leads to the greatest stability when closing open bites or aligning mandibular teeth and make this available to our members in the form of practice guidelines.

For another source of high-level articles, look to the American Association of Orthodontists’ website for a meta-analysis of mandibular intercanine width in treatment and postretention: <http://www.aaomembers.org/library>. The best article on this topic was published in the *Angle Orthodontist* in 1997 and reviews 26 research studies that describe mandibular intercanine width changes in the long term (Burke et al. 1997). The combined sample comprised 1233 subjects divided into subgroups based on pretreatment classification, including extraction and nonextraction treatment. This study clearly supports the concept of maintaining the original intercanine width in orthodontic treatment when treatment stability is the desired outcome. Is it not time to make this available to our members

as a practice guideline? Once a Cochrane critical review or a meta-analysis based on randomized controlled trials or weighted articles is completed, it takes many opposing studies to reverse the findings. If agreement between all persons involved, including carefully invited expertise, can be reached in fulfilling the goal of developing usable practice guidelines, patient care would improve—and that's what it's all about.

Some orthodontists fear that guidelines will simply lead to greater medical and legal entanglements than in the past. This issue is raised when our specialty is challenged by federal and state governments to care for unmet dental needs of the population. Based on our specialty's ethics, our primary responsibility is to deliver the best care available to those in need, and legal liabilities will not necessarily increase with that effort. Another concern is the valid question of who will determine the standards. I think that this question is currently being dealt with in some creative ways by the medical profession. A commentary by Sniderman and Furberg (2009) entitled, "Why guideline-making requires reform," is germane to this concern. They suggest that the manner in which most guidelines are written needs to be reformed. A failure to change the process risks replacing one authority-based system with another, whereas the core objective should be to strengthen an evidence-based approach to improve clinical care. Their suggested approach calls for the inclusion of special expertise relevant to the guideline being written: that is, if it covers the types of radiographs required to diagnose and plan treatment for an impacted canine, an oral and maxillofacial radiologist should be on a subgroup of the committee. Then, when the total guideline committee agrees with the new or revised guideline, it should be posted on the Internet with an invitation to all interested clinical and didactic persons to comment. This openness helps to ensure that, when legitimate differences of scientific opinion exist, there is an opportunity for exchange before the committee confirms its decision on a guideline. Just to be safe, before publication of the new guidelines Sniderman and Furberg recommend that the journal editor should submit the guidelines for scientific review, just as is any other article. The editor could also publish alternate points of view if they are submitted after this public airing. Finally, all financial conflicts of interest with commercial entities should be acknowledged and disclosed in detail.

Surely the public is best assured of quality treatment by the application of a single high level of care—irrespective of the educational and experiential qualifications of the practitioners providing the services. ... There should be but one standard of practice for reviewing and assessing all orthodontic treatment. Practical standards of treatment must be established (Riolo & Vaden 2009a, 2009b).

It is when issues like this one find their way into the mainstream of discussion that I find reason to be involved in finding a broader understanding of evidence-based practice. The many publics we find ourselves being exposed to recently want exposure to new research findings in their quest to resolve clinical questions. It is clear that orthodontic leaders want their articles published in journals with high-impact factors and suitable to share knowledge. Greater use of the multisite research collaborations may be capable of providing a boost to orthodontic knowledge base. After viewing nearly 1000 manuscripts a year as editor-in-chief of the *American Journal of Orthodontics and Dentofacial Orthopedics*, it is clear to me the publication of more systematic reviews will not satisfy the demand for evidence. Orthodontists' thirst for knowledge must be applicable to solving

their patients' needs, and I believe that multicenter randomized controlled clinical trials will do that more quickly than any other type of research.

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