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## COMMENTARY

# A practical approach to evidence-based dentistry

## Understanding and applying the principles of EBD

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Scientific evidence is a crucial underpinning of clinical practice. Nevertheless, the first series of articles aimed at providing clinicians with guidelines for critically appraising the evidence that informs clinical practices did not appear until 1981.<sup>1</sup> Ten years later, the term “evidence-based medicine”<sup>2</sup> first appeared in the medical literature. Subsequently, between 1993 and 2000, a group of evidence-based medicine enthusiasts<sup>3</sup> published a series of 25 articles that aimed at assisting clinicians in understanding and applying the medical literature to their clinical decision making in a clinical setting.<sup>4</sup>

The concept of evidence-based medicine soon expanded to other clinical areas. The first article to use the term “evidence-based dentistry” (EBD) was published in 1995 by Richards and Lawrence,<sup>5</sup> and since then other articles have been published on the topic.<sup>6-11</sup> There is, however, still no guide easily accessible for practicing dentists in the United States that addresses the critical appraisal and use of evidence specifically aimed at clinicians in oral health care fields.

A series of articles (Box) will be published in *The Journal of the American Dental Association*, aimed at providing an overview of the basic concepts of EBD to assist oral health care professionals in making use of evidence to inform their clinical decisions. The series will consist of, in addition to this introductory commentary, six core articles that will address the main topics in EBD. In this introductory commentary, we will define EBD, delineate its principles and outline the main steps in the process of EBD. The first core article will describe how to state questions in a format that facilitates searching for the evidence, and where and how to search for such evidence. In the remaining articles, we will explain how to use literature about therapy and prevention, etiology and prognosis, and diagnosis as well as systematic reviews and clinical practice guidelines.

### DEFINITION AND PRINCIPLES OF EBD

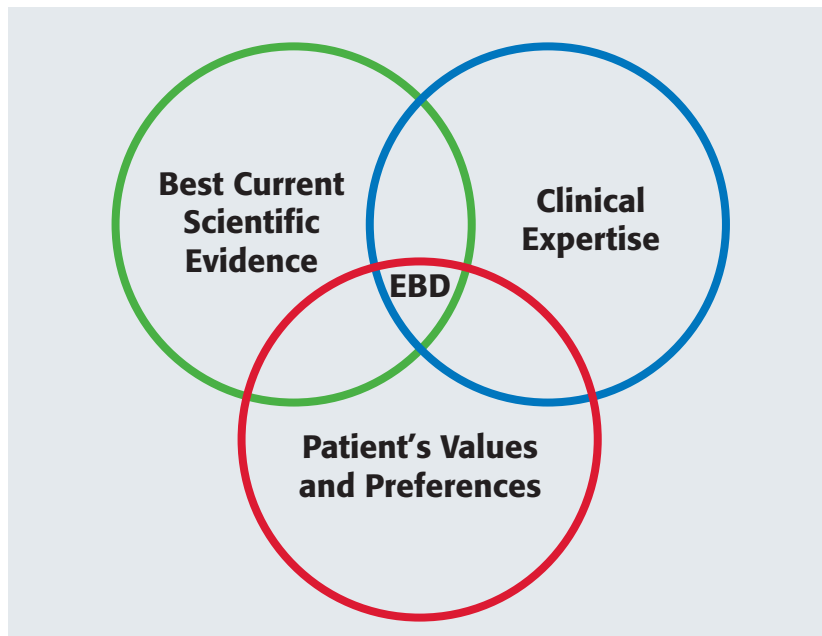
The American Dental Association defines EBD as “an approach to oral healthcare that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient’s oral and medical condition and history, with the dentist’s clinical expertise and the patient’s treatment needs and preferences.”<sup>12</sup> The definition of EBD has three main components:

- the best current research evidence;
- the clinician’s expertise;
- the patient’s values and preferences<sup>13</sup> (Figure).

**BOX**

**Topics in The Journal of the American Dental Association Evidence-Based Dental Practice series.**

- Introduction to and overview of evidence-based practice
- How to search for evidence to inform clinical decisions
- How to appraise and use an article about therapy, prevention or both
- How to appraise and use an article about etiology, prognosis or both
- How to appraise and use an article about diagnosis
- How to appraise and use a systematic review
- How to appraise and use a clinical practice guideline



**Figure.** The components of evidence-based dentistry (EBD).

One definition of evidence is “any empirical observation ... whether systematically collected or not.”<sup>14</sup> Evidence can be obtained from a range of sources, including clinical observation of the course of a single patient or a multicenter and multinational clinical study. Evidence to inform any clinical decision is abundant. However, as some evidence is more trustworthy than other evidence, it is both necessary and desirable to prioritize certain types of evidence.

Because unsystematic clinical observations of a small number of patients are more likely to introduce more bias than are appropriately designed and conducted clinical studies, for example, astute clini-

cians always should prefer the latter evidence to the former.<sup>14</sup> For each type of clinical question, there is a hierarchy of evidence that is based on degree of trustworthiness. For instance, to answer questions regarding the effectiveness of a particular intervention, the strongest evidence would come from randomized clinical trials with a low risk of bias and large sample sizes, as such evidence provides more precise estimates and more consistent results and is directly applicable to the patients at hand. If findings from such studies are not available for the specific question of interest, clinicians must rely on less trustworthy evidence, including well-designed and conducted observational studies, such as cohort and

case-control studies. If no randomized trials, cohort and case-control studies, or case series/case reports are available, individual observations by a clinical expert may become a valuable source of evidence. In subsequent articles, we will discuss the hierarchy of evidence for each type of clinical question (that is, etiology, prevention, therapy, diagnosis and prognosis) and how to appraise the relevant literature critically.

As stated above, evidence alone is not enough to support clinical decision making from an EBD perspective; decision making should rely on the integration of evidence with clinical expertise and patients’ needs and preferences. The success of an intervention that has proven to be effective in a clinical study depends on the ability of a clinician to use the intervention in an appropriate clinical setting. In other words, clinical expertise is key to determining whether and how the evidence can be applied to a specific patient’s case.<sup>14</sup> Finally, because clinical procedures are associated with potential adverse effects, including the burden of the procedure and its costs, it is important to consider patients’ values and preferences when making a decision regarding treatment.

**THE PROCESS OF EBD**

The decisions clinicians must make in daily clinical practice are the most important source of questions for which we seek evidence-based solutions. Such questions constitute the starting point of the EBD process, which encompasses the following main steps:

- translating the clinical question into a well-formulated searchable question format;
- searching for the best available evidence to answer this question;
- critically appraising the evidence and applying it to the particular clinical scenario that motivated the question.

To translate a clinical question into a well-formulated searchable question, it is necessary to identify four

main components of the question: the Patient or Population of interest, the Intervention (or exposure or new diagnostic test strategy, depending on the type of the clinical question), the Comparison (or reference standard, depending on the type of clinical question) and the Outcomes of interest according to a patient-centered approach—hence, PICO.<sup>15</sup> Examples of the PICO approach for the variety of types of clinical question will be discussed in detail in subsequent articles in this series.

The PICO components of the question at hand are used as the basis of searching for evidence in the literature by using electronic databases and other sources. There are a number of sources that provide clinicians with useful information. Depending on the degree of detail sought, information from primary studies, summaries and critical appraisals, and clinical practice guidelines may all provide evidence.<sup>16</sup> How to choose the most relevant source to search in any particular case will be addressed in subsequent articles in this series.

Once a clinician obtains the evidence to answer the clinical question at hand, it is necessary for him or her to conduct a critical appraisal of the evidence discovered. As will be described in detail in subsequent articles, the critical appraisal of individual primary studies has three main domains: risk of bias assessment, results and applicability.<sup>17</sup> The first domain explores whether the study was designed and conducted in a manner in which potential biases were minimized.<sup>18</sup> The second domain is an interpretation of the results of the study in terms of direction, magnitude and precision. The third domain contextualizes the available evidence to determine implications for clinical practice.<sup>19</sup> Subsequent articles in this series will cover how to appraise and apply evidence in a critical fashion to dif-

ferent types of clinical questions.

Scientific evidence constitutes one of the fundamental tenets of dental practice. Evidence-based dental practice integrates the use of the best available evidence, clinicians' expertise and patients' needs and preferences to inform decision making in clinical practice. This series of articles will provide oral health care professionals with the fundamental concepts of EBD and guidance on how to use evidence in their clinical practices. ■

doi:10.14219/jada.2014.102

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**Disclosure.** None of the authors reported any disclosures.

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