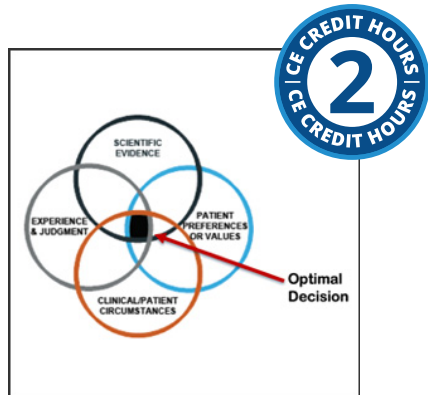


Evidence-based Decision Making: Introduction and Formulating Good Clinical Questions



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CE Credits: 2 hours

Intended Audience: Dentists, Dental Hygienists, Dental Students, Dental Hygiene Students

Date Course Online: 03/01/2008

Last Revision Date: 07/01/2021

Course Expiration Date: 06/30/2024

Cost: Free

Method: Self-instructional

AGD Subject Code(s): 130

Online Course: www.dentalcare.com/en-us/professional-education/ce-courses/ce311

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Conflict of Interest Disclosure Statement

- Dr. Jane Forrest has done consulting work for P&G and is a member of the P&G Oral Care Global Dental Hygiene Advisory Board. She has no relevant financial relationships to disclose.
- Ms. Lesley Kupiec worked part-time as a dental hygiene educator for P&G. She has no relevant financial relationships to disclose.

Introduction

The primary learning objectives for this course are to: 1) increase your knowledge of evidence-based concepts, principles and skills, and 2) specifically how to formulate a good clinical question in order to find relevant evidence to answer that question.

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Overview

The Evidence-based Decision Making (EBDM) process provides a mechanism for staying current in practice by addressing gaps in knowledge so that the clinician can provide the best care possible. To accomplish this, EBDM requires understanding new concepts and skills, the first and often the most difficult is how to ask an answerable question. This question provides the basis for identifying the key terms for conducting an efficient search, the second step of the EBDM process. These two steps provide the basis for the three that follow: critically appraising the evidence, applying the results in clinical practice, and evaluating the outcome. The EBDM approach recognizes that clinicians can never be completely current with all conditions, medications, materials, or available products, and provides a structured approach to keeping current.

Learning Objectives

Upon completion of this course, the dental professional should be able to:

- Define EBP (Evidence-based Practice).
- Define EBDM (Evidence-based Decision Making) and its purpose.
- Explain why EBP is not just a new term for an old concept.
- Identify two principles of EBDM.
- Discuss the need for EBDM.
- Identify the levels of evidence and premise upon which they are based.
- Describe the 5 steps and skills necessary for EBDM.

- Formulate a good question using the PICO process.
- Discuss the benefits of EBDM.

Introduction - What is EBDM?

Evidence has always contributed to clinical decision-making; however, with the proliferation of clinical studies and journal publications, keeping current with relevant research is nearly impossible. Because we rely on well-designed research studies to demonstrate the efficacy and effectiveness of diagnostic tests, treatment strategies, new materials, and products, knowing how to find the scientific evidence is an essential component for clinical practice.

Using evidence from the medical literature to answer questions, direct clinical action and guide practice was pioneered at McMaster University, Ontario, Canada in the 1980's. As clinical research and the publication of findings increased, so did the need to use the medical literature to guide practice. The old clinical problem-solving model based on individual experience or the use of information gained by consulting authorities (colleagues or text books) gave way to a new methodology for practice and restructured the way in which more effective clinical problem-solving should be conducted. This new methodology was termed **Evidence-Based Medicine (EBM)**¹ and its definition is currently stated as:

The integration of the best research evidence with our clinical expertise and our patient's unique values and circumstances.²

Rather than refer to medicine, often this definition has been broadened to mean 'practice' or 'healthcare' and is the definition we are using for **Evidence-Based Practice (EBP)**.

Several professions have adapted this definition to make it specific to their discipline. For example, the American Dental Association (ADA) defines "evidence-based dentistry" (EBD) as: an approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to patient's oral and medical

condition and history, with the dentists' clinical expertise and the patient's treatment needs and preferences.³

Inherent in these definitions is the recognition that research evidence is a valued component of the clinical decision-making process, and the intent is that the use of current best evidence does not replace clinical skills, judgment, or experience but provides another dimension to the decision-making process that also considers the patient's preferences (Figure 1).² It is this decision-making process that we refer to as **Evidence-Based Decision Making (EBDM)** and is defined as:⁴

The formalized process of using the skills for identifying, searching for and interpreting the results of the best scientific evidence, which is considered in conjunction with the clinician's experience and judgment, the patient's preferences and values, and the clinical/patient circumstances when making patient care decisions.

Again, EBDM is not unique to medicine or any specific health discipline, but represents a concise way of referring to the application of evidence to clinical decision-making.

Is Evidence-based Practice a New Term for an Old Concept?

The use of evidence in practice is not new. What is new is the nature of the clinical evidence itself in terms of the methods for gathering it [randomized controlled trials and other well-designed methods], the statistical tools for synthesizing and analyzing it [systematic reviews and meta-analysis], and the ways for accessing [electronic databases] and applying it [evidence-based decision-making and practice guidelines].⁵

In other words, evidence-based practice is not just a new term for an old concept and as a result of advances, practitioners need:

1. more efficient and effective online searching skills to find relevant evidence, and
2. critical appraisal skills to rapidly evaluate and sort out what is valid and useful, and what is not.

EBDM is the formalized process and structure for learning these skills with the purpose of **closing the gap** between what is known and what is practiced in order to improve patient care based on informed decision-making.

Principles of EBDM

Evidence-based decision-making is about solving clinical problems and involves **two fundamental principles**:⁵

Evidence-Based Decision Making

Integrating the Most Current Knowledge into Clinical Decision Making

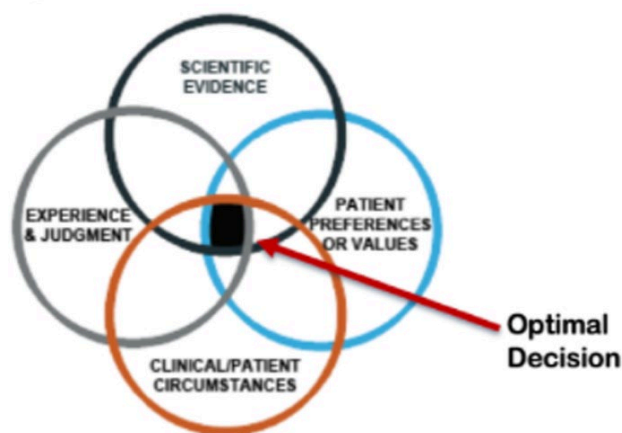


Figure 1. EBDM Process.
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1. *Evidence alone is never sufficient to make a clinical decision.* As EBP has evolved, so has the realization that the evidence from clinical research is only one key component of the decision making process and does not tell a practitioner what to do.
2. *A hierarchy of evidence exists to guide clinical decision-making.* EBDM is a structured process which incorporates a formal set of rules for interpreting the results of clinical research and places a lower value on authority or custom. In contrast to EBDM, traditional decision-making, relies more on intuition, unsystematic clinical experience and pathophysiologic rationale.

The Need for EBDM

An evidence-based approach emerged in response to the need for improving the quality of health care, keeping up with the evidence as it changes with new research, and demonstrating the best use of limited resources. Forces driving the need to improve the quality of care include:

1. variations in practice,
2. slow translation and assimilation of the scientific evidence into practice,
3. managing the information overload, and
4. changing educational competencies that require students to have the skills for lifelong learning.

Table 1. The Need For EBDM.

Forces Driving the Need for EBDM	Problem	Result of using EBDM
Variations in Practice^{6,7}	Translation of research for use in practice is not fully applied so that patients receive the best possible care.	Enhances consistency of practice. Increases standards of practice and practice guidelines based on scientific evidence.
Slow Translation and Assimilation of Research into Practice⁸	Patients do not receive the best possible care as soon as it is available and ineffective care is not discontinued.	Allows clinicians to stay current in order to close the gap between what is known and what is practiced.
Managing the Information Overload⁹	Ability to keep up with the increasing publication of clinical research studies in multiple journals and databases. Also, quick access to health information, new products and procedures is now available, however not all sources are accurate and can be misleading or not appropriate.	Access to computers and online databases, i.e., PubMed, allow clinicians to quickly find research evidence to accurately answer questions and provide patient-centered care that is based on an evaluation of the most recent scientific findings.
Changing Educational Requirements	ADA Accreditation Standards ¹⁰ and ADEA Competencies for the New Dentist ¹¹ and for Dental Hygienists ¹² have been updated and now require programs to integrate an evidence-based approach in clinical decision making. This is a change rather than a problem.	Greater emphasis is placed on the importance of comprehensive patient-centered care and the need for adding evidence-based decision-making to the traditional experienced-based decision-making approach.
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Levels of Evidence

Sources regarded as strong evidence include clinical practice guidelines, systematic reviews with meta-analyses, systematic reviews alone, individual randomized controlled trials (RCT), and well-designed non-randomized control studies (Figure 2). The hierarchy of evidence for treatment questions is based on the notion of causation and the need to control bias.¹³

Although each level may contribute to the total body of knowledge, "...not all levels are equally useful for making patient care decisions."¹³ As you progress up the pyramid, the number of studies and correspondingly, the amount of available literature decreases, while at the same time their relevance to answering clinical questions increases (Figure 3).¹³

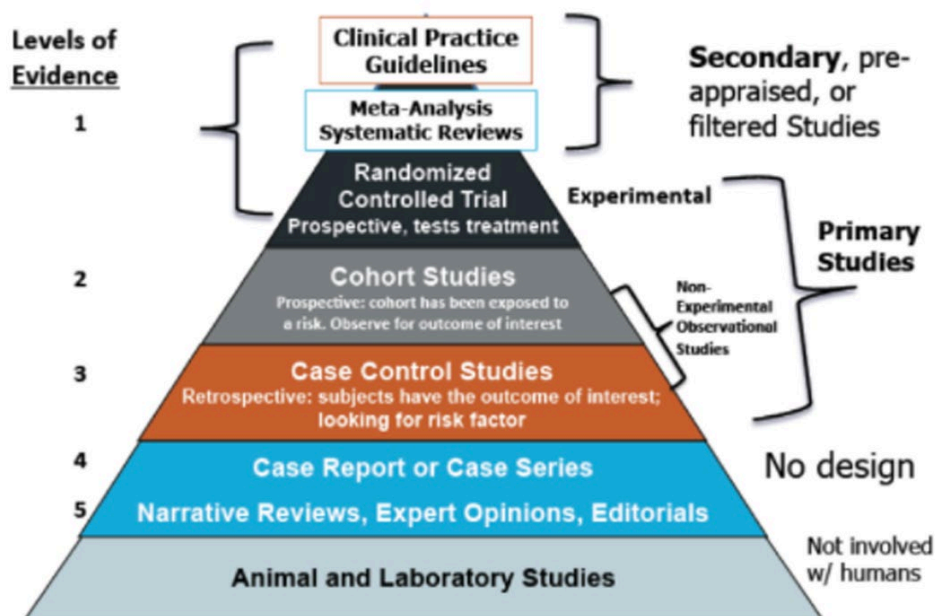


Figure 2. Hierarchy of Study Types and Levels of Clinical Evidence.

2016 Modified Evidence Pyramid. Copyright permission granted by SUNY Downstate Medical Center, Medical Research Library at Brooklyn



Figure 3. Available Literature and its Relevance.

Knowing which segment of the literature is appropriate for clinical decision-making and how to quickly retrieve this information is important to evidence-based practice. For example, the study methodology and level of evidence will differ based on the type of question asked, such as those derived from issues of therapy/prevention, diagnosis, etiology, and prognosis. Table 2 reviews the type of question and the highest levels of evidence based on the study methodology. For example, for questions associated with therapy and prevention, the highest level of evidence will be from meta-analyses or systematic reviews of randomized controlled trials (RCTs), since the objective of these studies is to test interventions demonstrating cause and effect and to select treatments that improve the condition/disease and avoid adverse events.⁵

Correctly identifying the type of study to answer the question is an important skill to develop to access the appropriate evidence when searching the healthcare literature. For example, identifying the best implant technique for replacing a single maxillary molar is a treatment question. Ideally, a meta-analysis or systematic review of RCTs would be available on the treatment being considered. If one were not available, then the next best evidence would be from a well-conducted individual RCT. However, when the focus of the question is on long-term outcomes of treatment, then it is a question of prognosis where the highest level of evidence would be provided by a systematic review of inception cohort studies, which are studies that follow patients from when a disease or condition first manifests itself clinically. And again, if a meta-analysis or systematic review were not available, the next highest level would be an individual inception cohort study, and so on down the hierarchy (Table 2). Two important concepts to keep in mind are that: 1) for any type of question, having a well-conducted meta-analysis or systematic review typically provides stronger evidence than a single study, and 2) a meta-analysis or systematic review is only as good as the individual studies that comprise it.

An excellent website that graphically displays the different types of research methods and designs can be found at the SUNY Downstate Medical Research Library of Brooklyn: Evidence-

Based Medicine Course, Guide to Research Methods - The Evidence Pyramid: Sorting Out EBM Study Types <https://guides.downstate.edu/c.php?g=856794&p=6152125>

EBDM Skills and the 5-Step Process

The principles of EBDM methodology are based on the abilities to find, critically appraise, and correctly apply current evidence from relevant research to decisions made in practice so that what is known is reflected in the care provided. The EBDM skills and 5-step process are outlined in Table 3.

The following procedures provide an overview of the five steps and skills involved in establishing an evidence-based practice.

1. **Converting information needs/problems into clinical questions so they can be answered – the PICO process.**

Asking the right question is a difficult skill to learn, yet it is fundamental to evidence-based practice. The process almost always begins with a patient question or problem. A “well-built” question should include four parts, referred to as PICO that identify the *Patient Problem or Population (P)*, *Intervention (I)*, *Comparison (C)*, and *Outcome(s) (O)*.² These parts, or components provide the key terms for step two.

2. **Conducting a computerized search with maximum efficiency for accessing the best external evidence with which to answer the question.**

This type of search requires a shift in thinking. Finding relevant evidence requires conducting a focused search of the peer-reviewed professional literature based on the appropriate methodology. Online databases and software that enable quick access to the literature have made it easier to locate relevant clinical evidence.

Knowing what constitutes the highest levels of evidence and how to apply evidence-based filters and limits will let you search the literature with maximum efficiency. It is the combination of technology and good evidence that allows healthcare professionals to apply the benefits from clinical research to patient care.

Table 2. Type of Question Related to Levels of Evidence and Study Methodology.

Type of Question	Type of Study or Methodology of Choice ¹⁴	Question Focus ^{15,16}	Why Study? ^{15,16}
Therapy/ Prevention	<p>Meta-analysis [MA] or Systematic Review [SR] of RCT's</p> <p>Single Randomized Controlled Trial</p> <p>SR of Cohort Studies</p>	<p>Study effect of therapy or test on real patients; allows for comparison between intervention group and control groups for a particular condition.</p> <p>Largest volume of EB Literature.</p>	<p>To select treatments, if any, that do more good than harm (improve function, avoid adverse events) that are worth the effort and cost.</p>
Diagnosis	<p>MA or SR of Controlled Trials (Prospective cohort study)</p> <p>Single Controlled Trial (Prospective-compare tests with a reference or "gold" standard test.)</p>	<p>Measures reliability of a particular diagnostic measure/test for a disease against the "gold standard" diagnostic measure for the same disease.</p> <p>Sensitivity and specificity of the measures are compared.</p>	<p>To select and interpret diagnostic methods or tests.</p> <p>To determine the degree to which a test is reliable and useful; establish the power of an intervention to differentiate between those with and without a target condition or disease.</p>
Etiology, Causation, Harm	<p>MA or SR of RCTs</p> <p>Single RCT</p> <p>SR/MA of Cohort Studies</p> <p>Single Cohort Study (Prospective data collection with formal control group.)</p>	<p>Compares a group exposed to a particular agent with an unexposed group.</p> <p>Important for understanding prevention and control of disease.</p>	<p>To identify causes of a disease or condition including iatrogenic forms.</p> <p>To determine relationships between risk factors, potentially harmful agents, and possible causes of a disease or condition.</p>
Prognosis	<p>MA or SR of Inception Cohort Studies (Follow patients from when disease 1st becomes clinically manifest)</p> <p>Cohort Study</p>	<p>Follows progression of a group with particular disease and compares with a group without the disease.</p> <p>Groups must be as similar as possible and must have good follow-up>80% of each group.</p>	<p>To estimate clinical course or progression of a disease or condition over time and anticipate likely complications (and prevent them).</p>

Table 3. Skills needed to apply the EBDM Process.²

1. **ASK:** Convert information needs/problems into clinical questions so that they can be answered.
2. **ACCESS:** Conduct a computerized search with maximum efficiency for accessing the best external evidence with which to answer the question.
3. **APPRAISE:** Critically appraise the evidence for its validity and usefulness (clinical applicability).
4. **APPLY:** Apply the results of the appraisal, or evidence, in clinical practice.
5. **ASSESS:** Assessing the process and your performance.

To assist professionals in keeping up with the literature and in making it possible to quickly find needed information without leaving your location, online access to MEDLINE via PubMed, <http://www.ncbi.nlm.nih.gov/pubmed>, is provided by the National Library of Medicine (NLM). See the dentalcare.com course, [Strategies for Searching the Literature Using PubMed](#), for step-by-step guidance.

3. Critically appraising the evidence for its validity and usefulness (clinical applicability).

Once you have found the most current evidence, the next step in the EBDM process is to understand what you have and its relevance to your patient and the PICO question. Resources are available to help you critically appraise individual research studies and meta-analyses or systematic reviews. They consist of a worksheet with a structured series of questions that can help you determine the strengths and weaknesses of how a study was conducted and how useful and applicable the evidence is to the specific patient problem or question being asked.¹⁷⁻¹⁹

4. Applying the results of the appraisal, or evidence, in clinical practice.

Once the methods are determined to be valid, the fourth step is to determine if the results (potential benefits or harms) are important. This is achieved by looking at whether there is an association between specific treatments and outcomes or exposures, the strength of that association, and the condition

of interest, i.e., your patient problem or question. Understanding how to present statistical information to patients in a clear and unambiguous manner will help in making good patient care decisions. Differences between groups in clinical trials are generally straight forward when expressed in terms of the mean values; whereas, results presented as proportions, such as relative risk reduction, absolute risk reduction, odds ratio and numbers needed to treat (NNT), are more challenging to understand. Also, understanding the difference between statistical and clinical significance will help you in translating and determining if the findings apply to your patient.

5. Assessing the process and your performance

The final step in EBDM is evaluation of the effectiveness of the process. Mastering the skills of evidence-based decision making takes practice and reflection and a clinician who is new to the steps should not be discouraged by early difficulties encountered. Evaluating the process of EBDM may include a range of activities such as examining outcomes related to the health/function of the patient and patient satisfaction. Self-evaluation of developing skills is a most critical aspect in mastery of EBDM. With an understanding of how to effectively use EBDM, you can quickly and conveniently stay current with scientific findings on topics that are important to you and your patients.

EBDM in Action

The PICO Process (Skill/Step 1)

The formality of using PICO to frame the question forces the questioner to focus on what the patient believes is the most important problem and the desired outcome. Doing this facilitates selecting language or key terms for conducting the computerized search, the second step in the process. Next, it allows you to determine the type of evidence and information required to solve the problem and the outcome measures that will be used to determine the effectiveness of the intervention.

One of the greatest difficulties in developing each aspect of the PICO question is providing an adequate amount of information without being too detailed. Each component of the PICO question should be stated as a concise short phrase as illustrated in the following case example.

Case Example

Your new patient, Mr. Nathan Baker, is a 20-year old student-athlete who has been swimming competitively since he was 12 years-old. His chief complaint is about the smooth, yellow areas near his gum line that he recently noticed. He wants to know what might be causing this and if there is anything he can do to fix and/or prevent it from getting worse. When reviewing his health history and behaviors, you learn that Nathan is a vegetarian, frequently snacking throughout the day on healthy fruits and vegetables. He also consumes sports drinks and an occasional energy drink with his hectic student/athlete schedule.

Nathan currently uses a manual toothbrush right after every meal, flosses nightly, and uses whatever fluoride toothpaste is on sale when he goes to buy one. He was apologetic for not getting in for his hygiene visits at all last year. Since you suspect his chief complaint is due to erosion, you perform the Basic Erosive Wear Examination (BEWE),²⁰ an easy to use scoring system to measure erosive wear, recording the most severely affected tooth in each sextant. [\[See TABLES 1 and 2\]](#) for the criteria for grading erosive tooth wear and risk levels as a guide to clinical management.²⁰ Nathan's cumulative BEWE score of 10 alerts you that he is at medium risk for erosive wear, confirming your initial thought.

As summarized by White et al, "Erosive tooth wear (ETW) is an umbrella term that includes dental erosion, abfraction, attrition and abrasion, alone or in combination."²¹ From Nathan's assessments, we know that he has a moderate amount of ETW due to multiple risk factors including his: diet and dietary habits, oral health regimen, and his competitive swimming. Unlike dental caries, which begins by demineralization and is a subsurface, reversible disease process in early stages, dental erosion is characterized by irreversible surface and near surface damage to the tooth structure.²² Due to the permanent loss of hard tissue by ETW, it is very important that dental professionals assess, recognize and intervene to protect enamel from further destruction when signs exist. However, management of ETW may be challenging due to the multifactorial nature of the disease process.²²

After discussing each of Nathan's risk factors, he realizes that some of his habits are contributing to his oral health problem. He had always thought being a vegetarian was healthy and that it was good to brush right after meals. He did not know that his diet was acidic and eating too frequently could contribute to erosion.^{23,24} Nor did he realize that he should wait 1-2 hours before brushing his teeth after an acid exposure,²¹ or that as a competitive swimmer, if he is training in water with a pH lower than the optimal (7.2-8.0) he may be subject to further erosion.²⁵

You both agree on changes that he can make with his eating and oral care habits but realize there are some things that aren't going to change – like the fact he is a competitive swimmer and plans to remain a vegetarian. He then asks you about the toothpaste he should be using. He asks you about Sensodyne Pronamel® (a sodium fluoride toothpaste with potassium nitrate), since he recently heard a TV commercial stating that it helps with erosion. You typically recommend a stannous fluoride toothpaste, like Crest Pro-Health, but are not sure which one will be more effective in preventing the initiation and further progression dental erosion.

To answer Mr. Baker's question, you investigate the two options so each of you are fully informed about the pros and cons before selecting a treatment. With the increased

Table 4. PICO Worksheet for Mr. Baker's Case.

PICO Worksheet for Mr. Baker's Case													
<p>Define your PICO Components (OUTCOME MUST MATCH THE PROBLEM)</p> <p><i>Your question should be used to help establish your search strategy</i></p>													
<p>1. Problem: _____</p>													
<p>2. Intervention: _____</p>													
<p>3. Comparison: _____</p>													
<p>4. Outcome: _____</p>													
<p>5. Write out your question using the formula. (USE PICO COMPONENTS).</p> <p>_____</p> <p>_____</p> <p>_____</p>													
<p>6. Identify the Type of question. Circle one:</p> <table border="0"> <tr> <td>Therapy/Prevention</td> <td>Diagnosis</td> <td>Etiology/Causation/Harm</td> <td>Prognosis</td> </tr> </table>		Therapy/Prevention	Diagnosis	Etiology/Causation/Harm	Prognosis								
Therapy/Prevention	Diagnosis	Etiology/Causation/Harm	Prognosis										
<p>7. Identify the type of study to include in your search.</p> <table border="0"> <tr> <td><input type="checkbox"/> Meta-Analysis</td> <td><input type="checkbox"/> Systematic Review</td> <td><input type="checkbox"/> Randomized Controlled Trial</td> </tr> <tr> <td><input type="checkbox"/> Clinical Trial Cohort Study</td> <td><input type="checkbox"/> Practice Guidelines</td> <td><input type="checkbox"/> Case series or Case Report</td> </tr> <tr> <td><input type="checkbox"/> Cohort Study</td> <td><input type="checkbox"/> Case Control Study</td> <td><input type="checkbox"/> Literature Review</td> </tr> <tr> <td colspan="3"><input type="checkbox"/> Other: _____</td> </tr> </table>		<input type="checkbox"/> Meta-Analysis	<input type="checkbox"/> Systematic Review	<input type="checkbox"/> Randomized Controlled Trial	<input type="checkbox"/> Clinical Trial Cohort Study	<input type="checkbox"/> Practice Guidelines	<input type="checkbox"/> Case series or Case Report	<input type="checkbox"/> Cohort Study	<input type="checkbox"/> Case Control Study	<input type="checkbox"/> Literature Review	<input type="checkbox"/> Other: _____		
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<input type="checkbox"/> Clinical Trial Cohort Study	<input type="checkbox"/> Practice Guidelines	<input type="checkbox"/> Case series or Case Report											
<input type="checkbox"/> Cohort Study	<input type="checkbox"/> Case Control Study	<input type="checkbox"/> Literature Review											
<input type="checkbox"/> Other: _____													
<p>8. List main topics and alternative terms from your PICO question that can be used for your search.</p> <table border="0"> <tr> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> </table>		_____	_____	_____	_____	_____	_____						
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<p>9. List inclusion criteria – e.g., gender, age, year of publication</p> <table border="0"> <tr> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> </table>		_____	_____	_____	_____	_____	_____						
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<p>List irrelevant terms</p> <table border="0"> <tr> <td>_____</td> </tr> <tr> <td>_____</td> </tr> <tr> <td>_____</td> </tr> </table>		_____	_____	_____									

<p>10. List where you plan to search, e.g., MEDLINE, PubMed, Cochrane Database, Trip, Other:</p> <p>_____</p>													

incidence of tooth erosion and the vast number of toothpaste options, this information will be a valuable addition to your evidence-based “library” that you are creating in your office.

To find the answer, you must define Nathan’s question so it facilitates an efficient search of the literature. To guide this process, the PICO Worksheet and Search Strategy form can assist you (Table 4).

Applying the PICO Process

The first step in developing a well-built question is to identify the patient problem or population [P] by describing either the patient’s chief complaint or by generalizing the patient’s condition to a larger population. The problem is further shaped or refined by the most important characteristics that might influence the results such as:

- Level of disease or health status
- Age, race, gender, previous conditions, past and current medications

In Nathan Baker’s case, we know the chief complaint or the Problem is erosive tooth wear and that his home care, diet, and possibly swimming are contributing factors.

Identifying the Intervention [I] is the second step in the PICO process. It is important to identify what new treatment option is being considered or what the patient is asking about, which keeps the process patient-centered. This may include the use of a specific diagnostic test, treatment, adjunctive therapy, medication, or the recommendation to the patient to use a product or procedure. The Intervention is the new consideration for that patient.⁴ In Nathan’s case, the intervention being considered is the Sensodyne Pronamel® (a sodium fluoride toothpaste with potassium nitrate).

The third phase of the well-built question is the Comparison [C], which is the main alternative (intervention) you are considering.² It should be specific and limited to one alternative choice, as is the Intervention. The C is typically the accepted procedure you perform, or the gold standard. Having specified just one “I” and one “C” facilitates an effective computerized search. The Comparison is the only optional component in the PICO question since there

may not be an alternative, however when there is one, it should be used. In our case, we have selected the stannous fluoride toothpaste, Crest Pro-Health, as the main alternative.

The final aspect of the PICO question is the outcome [O]. This specifies the result(s) of what you plan to accomplish, improve, or affect. It should be measurable and directly solve the problem. Examples of outcomes are more, or as effective in relieving or eliminating specific symptoms, improving or maintaining function, and enhancing esthetics. In Nathan’s case, you are seeking evidence that demonstrates the effectiveness of Sensodyne Pronamel® toothpaste under a given set of conditions, i.e., effective in preventing tooth erosion. Outcomes yield better search results when defining them in specific terms and they should solve the specific problem. *“More effective or just as effective”* are not acceptable outcomes unless they describe how the intervention is more effective or just as effective as the Comparison. For our example, more effective in preventing tooth erosion is the desired outcome.

Structuring the PICO Question

After understanding the elements of PICO and identifying each PICO component, you are now ready to structure the PICO question for Nathan’s case. The same exact terms/wording used for each PICO component, is used to construct the PICO question. The formula for writing the Question is:

For a patient with ____ (P) ____, will ____ (I) ____ as compared to ____ (C) ____ increase/decrease be as or more effective in ____ (O) ____?

The PICO question for Nathan is then written as:

“For a patient with erosive tooth wear (P), will Sensodyne Pronamel® (a sodium fluoride toothpaste with potassium nitrate) (I), as compared to Crest Pro Health (a stannous fluoride toothpaste) (C), be more effective in preventing erosive tooth wear (O)?”

Following the PICO Worksheet (Table 5), you would then identify the type of question and study, and then list any additional terms or

Table 5. PICO Worksheet for Mr. Baker's Case.

PICO Worksheet for Mr. Baker's Case	
Define your PICO Components (<i>OUTCOME MUST MATCH THE PROBLEM</i>).	
Your question should be used to help establish your search strategy	
1. Problem:	<u>erosive tooth wear</u>
2. Intervention:	<u>sodium fluoride + potassium nitrate toothpaste (Sensodyne Pronamel®)</u>
3. Comparison:	<u>stannous fluoride toothpaste (Crest Pro-Health)</u>
4. Outcome:	<u>more effective in preventing erosive tooth wear</u>
5. Write out your question using the formula. (<i>USE PICO COMPONENTS</i>).	
For a patient with erosive tooth wear, will sodium fluoride + potassium nitrate toothpaste (Sensodyne Pronamel®), as compared to stannous fluoride toothpaste (Crest Pro-Health), be more effective in preventing erosive tooth wear?	
6. Identify the Type of question. Circle one:	
<input checked="" type="radio"/> Therapy/Prevention	Diagnosis Etiology/Causation/Harm, Prognosis
7. Identify the type of study to include in your search.	
<input checked="" type="checkbox"/> Meta-Analysis	<input checked="" type="checkbox"/> Systematic Review <input checked="" type="checkbox"/> Randomized Controlled Trial
<input checked="" type="checkbox"/> Clinical Trial Cohort Study	<input checked="" type="checkbox"/> Practice Guidelines <input type="checkbox"/> Case series or Case Report
<input type="checkbox"/> Cohort Study	<input type="checkbox"/> Case Control Study <input type="checkbox"/> Literature Review
<input type="checkbox"/> Other: _____	
8. List the main topics and alternative terms from your PICO question that can be used for your search.	
<u>Erosive tooth wear, tooth erosion, tooth wear,</u>	<u>tooth attrition, tooth abrasion</u>
<u>Sodium fluoride + potassium nitrate toothpaste</u>	<u>Stannous fluoride toothpaste/dentifrice</u>
<u>Sensodyne Pronamel® dentifrice</u>	<u>Crest Pro-Health toothpaste</u>
9. List inclusion criteria – e.g., gender, age, year of publication	
<u>Competitive swimmer</u>	<u>Sodium fluoride (FL) toothpaste, FL mouthrinses</u>
<u>Vegetarian</u>	<u>Sensitivity or hypersensitivity, FL varnish, gels</u>
<u>_____</u>	<u>Crest sodium FL or MFP toothpaste,</u>
<u>_____</u>	<u>Sensodyne toothpaste, dental caries</u>
10. List where you plan to search, e.g., MEDLINE, PubMed, Cochrane Database, Trip, Other:	
<u>PubMed, Trip, ADA Center for EBD and Cochrane database</u>	

phrases related to the already identified **P, I, C, and O**. By generating these words, alternative key terms are identified that facilitate finding evidence to answer your question, Step 2, conducting a computerized search with maximum efficiency. For example, key terms that could be used in the search are: erosive tooth wear, tooth erosion, stannous fluoride, sodium fluoride with potassium nitrate, Sensodyne Pronamel® toothpaste or dentifrice, Crest Pro Health toothpaste or dentifrice. An example of a completed PICO Worksheet for Nathan Baker's case is shown in Table 5.

Benefits of EBDM

EBDM provides a strategy for improving the efficiency of integrating new evidence into patient care more rapidly by helping you manage an increasing amount of information. EBDM assists you in developing treatment plans and providing treatment and advice that are scientifically defensible. In addition, it helps ensure that your practice is continually informed

and strengthened by current research findings, helping to close the gap between what is known (research evidence) and what is practiced.

EBDM is not about knowing all the answers, but rather about knowing how to structure good questions to be able to find relevant information to better inform your decision making, and how and when to integrate new thinking and action into everyday practice.

Conclusion

Recognizing that clinicians have time constraints and yet want to provide the best possible care to their patients, an evidence-based approach offers clinicians a convenient method for finding current research to support clinical decisions, answer patient questions, and explore alternative treatments, procedures, or materials. With an understanding of how to effectively use EBDM, practitioners can quickly and conveniently stay current with scientific findings on topics that are important to them and their patients.

Course Test Preview

To receive Continuing Education credit for this course, you must complete the online test. Please go to: www.dentalcare.com/en-us/professional-education/ce-courses/ce311/test

- 1. Which of the following is not a component in defining evidence-based practice:**
 - A. Clinical expertise
 - B. Patient values
 - C. Scientific research
 - D. Clinical conditions
 - E. Personal intuition
- 2. The purpose of EBDM is to:**
 - A. emphasize new research findings
 - B. close the gap between research and practice
 - C. defer to patients' wishes
 - D. use expert opinions
 - E. base decisions on RCT results.
- 3. EBDM is just a new term for clinical decision-making.**
 - A. True
 - B. False
- 4. EBDM requires online searching skills and understanding research methods.**
 - A. True
 - B. False
- 5. Evidence can change over time as new research studies are conducted.**
 - A. True
 - B. False
- 6. The highest level of evidence is the same for treatment and prognosis questions.**
 - A. True
 - B. False
- 7. Which of the following provides the highest level of evidence for treatment questions?**
 - A. Case Control Study
 - B. Cohort Study
 - C. Systematic Review of RCTs
 - D. Randomized Controlled Trial
 - E. Case Report
- 8. Systematic reviews typically provide a higher level of evidence than a single study.**
 - A. True
 - B. False
- 9. As you progress up the levels of evidence, the amount of available literature also increases.**
 - A. True
 - B. False

- 10. As you progress up the levels of evidence, the literature becomes more relevant for answering therapy related questions.**
A. True
B. False
- 11. The first step in the EBDM process is:**
A. finding the best evidence
B. applying the results to patient care
C. asking a good clinical question
D. evaluating the results
E. critically appraising the evidence
- 12. Which of the following characteristics describes the Intervention in the PICO process?**
A. New treatment option being considered.
B. Main concern or chief complaint.
C. Measurable result.
D. Alternative.
- 13. The only optional component of the PICO question is:**
A. P
B. I
C. C
D. O
E. NA, there is no optional component.
- 14. The purpose of defining the PICO question includes all of the following EXCEPT:**
A. identifying a clearly focused clinical question
B. considering what the patient/client believes is important
C. providing key search terms
D. determining the type of evidence required to solve the problem
E. identifying the data base to search.
- 15. Select the PICO component that is missing or incomplete from this question:**

Will an antimicrobial therapy (minocycline HCl) in conjunction with scaling and root planing as compared to scaling and root planing alone, be more effective in preventing further attachment and bone loss?
A. P
B. I
C. C
D. O
- 16. Benefits of the EBDM process include:**
A. Provides a strategy for improving the efficiency of integrating new research evidence into patient care more rapidly by helping you manage an increasing amount of information.
B. Assists in developing treatment plans and providing treatment and advice that are scientifically defensible.
C. Helps ensure that practice is continually informed and strengthened by current research findings.
D. A, B and C
E. A and C only

17. Read the following scenario and identify the Problem (P):

Mrs. Sanchez is a 58-year-old women who is concerned about getting root surface cavities due to her receding gums. Her children receive fluoride treatments to prevent caries on their teeth and asks you if she should be getting professionally applied fluoride treatments. Having recently read an article on chlorhexidine varnish (CHx-V) for the prevention of root caries you want to reread it to see if a CHx-V or Fluoride Varnish, which you normally provide, will be more effective.

- A. Fluoride varnish
- B. Receding gums
- C. Chlorhexidine varnish
- D. Root caries

18. For the scenario in Question #17, identify the Intervention (I):

- A. Fluoride varnish
- B. Receding gums
- C. Chlorhexidine varnish
- D. Root caries

19. Identify the Problem in the following scenario:

Kevin is a 26-year-old man who talks to you about e-cigarettes and wants to know if they can help him permanently stop smoking. He has smoked since he was 16 and has never tried to quit before, but recently he has noticed his gums are bleeding and thinks it is due to his smoking. He also asks if e-cigarettes are better than nicotine gum.

- A. E-cigarettes
- B. Permanently stop smoking
- C. Bleeding gums
- D. Nicotine gum

20. Select the most appropriate PICO question for the following scenario:

Kevin is a 26-year-old man who talks to you about e-cigarettes and wants to know if they can help him permanently stop smoking. He has smoked since he was 16 and has never tried to quit before, but recently he has noticed his gums are bleeding and thinks it is due to his smoking. He also asks if e-cigarettes are better than nicotine gum.

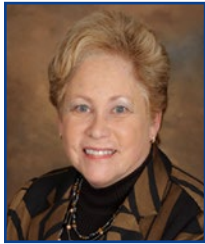
- A. Are e-cigarettes better than nicotine gum?
- B. For a patient with bleeding gums, are e-cigarettes as compared to nicotine gum better?
- C. For a patient who wants to permanently stop smoking, will e-cigarettes as compared to nicotine gum be more effective in permanently stopping smoking?
- D. For a patient who wants to permanently stop smoking, will e-cigarettes be more effective than nicotine gum in stopping smoking?

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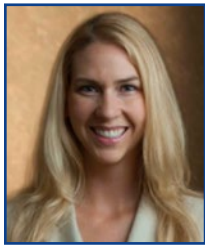


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