Enhancing your practice through evidence-based decision making: PICO, learning how to ask good questions

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This article is the second of a feature series that focuses on strategies that can be used to integrate an evidence-based decision-making (EBDM) approach into your practice or curriculum. The first article provided an overview of EBDM methodology and skills, introduced readers to evidence-based concepts, and identified related online resources. The purpose of this article is to discuss PICO, a systematic process for converting information needs/problems into clinical questions so that they can be answered. Two case scenarios outline the sequential steps in this process and demonstrate the application of the skills involved. Educational tips and learning activities are provided, along with online resources that supplement the information on learning how to ask a good question.

—*Jane L. Forrest, Associate Editor*

The clinician's need to access new information is becoming more critical as patients become more informed health care consumers. In the case example from the first feature, the patient's concerns did not subside when the clinician gave her advice. "To reassure her, you give her advice based on your clinical experience and judgment; however, she still seems very upset and troubled. You inform her that you will do a thorough search of the current scientific literature and get back to her with your findings. She seems more relaxed with this thought and leaves, eager to hear from you soon." The evidence-based approach guides clinicians to form well-built questions that result in patient-centered answers, improving the quality of care.

Through the EBDM process, you can provide valuable information to your patients and staff and stay informed about procedures, policies, and materials in your field. Your credibility also will increase when current best evidence is effectively communicated in such a way that patients are able to make better-informed decisions.

Asking the right question is perhaps the hardest skill to learn— and yet it is fundamental to the EBDM process. A "well-built" question should include 4 parts that identify the patient problem or population (P), intervention (I), comparison (C), and outcome(s) (O), referred to as *PICO*.[1] This question is often generated directly by the patient or the care being considered for that patient. However, it can also emerge from an observed problem or a topic of interest, or to explore a new material or procedure, to clarify differences, or compare cost-effectiveness in practices among associates, hygienists, and other members of the office team.[2]

Table 1. PICO worksheet

Name_____

1. Define your question using PICO by identifying Population, Intervention, Comparison group, and Outcomes.

Your question should be used to help establish your search strategy.

    • Patient/Population_____

    • Intervention_____

    • Comparison_____

    • Outcome_____

Write out your question:_____

_____

List main topics and alternate terms that can be used for your search—eg, *headache* and *migraine*.

_____   _____

_____   _____

_____   _____

_____   _____

List your inclusion criteria—sex, age, year of publication, study type.

_____

_____

_____

_____

List irrelevant terms that you may want to exclude in your search.

_____

_____

_____

_____

The formality of using PICO to frame the question serves 3 key purposes:

- First, it forces the questioner to focus on what the patient/client believes to be the single most important issue and outcome.
- Second, it facilitates the next step in the process, the computerized search, by selecting language or key terms that will be used in the search.[1]
- Third, it directs one to clearly identify the problem, results, and outcomes related to the specific care provided to that patient.

This, in turn, allows you to determine the type of evidence and information required to solve the problem and to measure the effectiveness of the intervention. In addition, you can better evaluate your effectiveness in applying the EBDM process. Thus, EBDM supports continuous quality improvements through measuring outcomes of care and self-reflection.

One of the greatest difficulties in developing each aspect of the PICO question is providing an adequate amount of information without being too detailed. It is important to stay focused on the main components that directly affect the situation. Each component of a PICO question should be specific, rather than a laundry list of everything you can think of regarding that problem or patient. Each component of the PICO question should be stated in a concise phrase.

Application of the PICO process in clinical practice is best illustrated with an example. This is the same case study that was presented in the first feature, and it will be used as we demonstrate each aspect of the evidence-based decision-making process.

CASE EXAMPLE

Your morning patient, Mrs Jennifer Morris, comes to you distressed because of an article she read on the Internet about the dangers of mercury in her amalgam restorations. She is worried that her 7 amalgam fillings are poisoning her. She is very concerned, not only for her own health but for her 2 young daughters who also have amalgam restorations. Jennifer doesn't want to replace her fillings if it isn't necessary, but she needs proof that she and her children are going to be healthy.

To reassure her, you give her advice based on your clinical experience and judgment; however, she still

Table 2. Formulating the "well-built" question

For a (Patient/Population/Problem) will (Intervention) as compared with (Comparison—if there is one) provide (or result in) (Outcome).[1]

Modified from Sackett et al, 1997. Centre for Evidence-Based Medicine, *http://cebm.jr2.ox.ac.uk/docs/focusquestion.html*

seems very upset and troubled. You inform her that you will do a thorough search of the current scientific literature and get back to her with your findings. She seems more relaxed with this thought and leaves, eager to hear from you soon.

To find the answer, you must first define Jennifer's question so that it will facilitate an efficient search of the literature. However, before a question can be built, it is important to identify the appropriate building materials. This process has been outlined in a worksheet that was developed as part of a training grant, "Integrating EBDM into Curricula" (Table I). Once this is completed, writing a question becomes an easy task by following a simple format (Table II).

The first step in developing a well-built question is to identify the patient problem or population. This is done either by describing the patient's chief complaint or by generalizing the patient's condition to a larger population. It is helpful to consider the following when identifying the *P* in PICO.

1. How would you describe a group with a problem similar to your patient's?
2. How you would describe the patient to a colleague?
3. What are the most important characteristics of this patient?
   • Primary problem
   • Patient's main concern or chief complaint
   • Disease or health status
   • Age, race, sex, previous ailments, current medications
   • Should these characteristics be considered as I search for evidence?[1]

The *P* phrase could be more detailed if the added information influences the results you expect to find. These additional items may include such characteristics as age, sex, health history, or medications. However, in this case, it is not necessary to define the patient as a middle-aged woman because we are looking for results that do not differ among age groups or sex.

Identifying the intervention is the second step in the PICO process. It is important to identify what you plan to do for that patient. This may include the use of a specific diagnostic test, treatment, adjunctive therapy, or medication, or the recommendation to the patient to use a product or procedure. The intervention is the main consideration for that patient or client.[1]

The third phase of the well-built question is the comparison, which is the main alternative you are considering.[1] It should be specific and limited to one alternative choice to ensure an effective computerized search. The comparison is the only optional component in the PICO question. Oftentimes, one may only look at the intervention without exploring alternatives, and in some cases, there may not be an alternative.

The final aspect of the PICO question is the outcome. This specifies the result(s) of what you plan to accomplish, improve, or affect and should be measurable. Outcomes may consist of relieving or eliminating specific symptoms, improving or maintaining function, or enhancing esthetics. In Jennifer's case, you are finding evidence to prove the safety of her existing amalgam restorations.

Specific outcomes also will yield better search results. When defining the outcome, stating it as "*more effective*" is not acceptable unless it describes how the intervention is more effective. For example, is it more effective in preventing caries or in decreasing probing depths?

After understanding the elements of PICO and identifying the patient's concerns, you are now ready to build your PICO question.

P, PATIENT PROBLEM OR POPULATION

The first part of the PICO question begins with the following phrase: "For a patient with..." Inserting the patient's chief complaint or condition completes this phrase. Using the case for Jennifer, this phrase can be completed as follows: "For a patient with amalgam restorations..."

I, INTERVENTION

In this case, Jennifer doesn't want to replace her fillings if it isn't necessary. The main intervention to consider for Jennifer is no treatment, or leaving her amalgams as they are. The question now reads: "For a patient with amalgam restorations, will leaving the amalgam restorations intact...?"

Table 3. Completed PICO worksheet

Name_____

Define your question using PICO by identifying Population, Intervention, Comparison group, and Outcomes.

Your question should be used to help establish your search strategy.

- Patient/Problem   <u>Patient with sound amalgam restorations</u>
- Intervention   <u>will leaving them intact</u>
- Comparison   <u>replacing them</u>
- Outcome   <u>no adverse general or oral health effects and safe amalgam restorations</u>

Write out your question: <u>"For a patient with amalgam restorations, will leaving the amalgam restorations intact, as compared with replacing them, result in no adverse general or oral health effects and in safe amalgam restorations?"</u>

List main topics and alternate terms that can be used for your search—eg, *headache* and *migraine*.

- Silver fillings
- Silver restorations
- Amalgam fillings
- Dental fillings
- Mercury
- Mercury poisoning
- Amalgam poisoning
- Amalgam safety
- Patient safety
- Oral health

List your inclusion criteria—sex, age, year of publication, study type.

- All ages
- 1966-present
- Randomized clinical trials
- Clinical trials
- Systematic review
- Meta-analysis

List irrelevant terms that you may want to exclude in your search.

- Other restoration materials—crowns, composites, etc.

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C, COMPARISON

In Jennifer's case we are exploring the alternative of replacing her amalgams with another restoration. The comparison phrase is stated as, *compared with replacing her amalgams*. As mentioned earlier, you can phrase your question more specifically by including the type of restoration that would be used to replace the amalgams. However, the main result we are comparing is the actual need for replacement—regardless of whether it is a crown or composite restoration.

O, OUTCOME(S)

Jennifer's main concern is finding proof that she and her children are going to be healthy if they leave their amalgams as they are. The outcome(s) are then phrased as, "result in no adverse general or oral health effects and in safe amalgam restorations."

On the basis of these 4 parts, the final PICO question can be stated as: "For a patient with amalgam restorations, will leaving the amalgam restorations intact, as compared with replacing them, result in no adverse general or oral health effects and in safe amalgam restorations?"

Following the PICO worksheet (Table I), you would then list any additional terms or phrases related to the already identified *P*, *I*, *C*, and *O*. By generating these words, you identify alternative key terms that may facilitate finding evidence to answer your question. For example, another way of referring to *amalgam restoration* would be *amalgam filling* or *silver filling*. By spec-

ifying these prior to conducting a search, your time will be used more efficiently. A completed PICO worksheet for Jennifer's case is shown in Table III.

In Jennifer's case the main focus of the PICO question is on the outcome because it is the center of her concern. She is worried that her 7 amalgam fillings are poisoning her and needs proof that she and her children are going to be healthy. Her chief complaint concerns the safety of her keeping the amalgam restorations. However, in most cases the main focus of the PICO question is on the intervention (ie, which treatment option is most effective given the oral condition, your clinical experience and judgment, and the patient's preferences).

Focus on the intervention is demonstrated in the case of Mr Bruce Logan, a 57-year-old diagnosed with adult periodontitis and a few localized persistent lesions at probing depths greater than 5 mm. His treatment plan includes multiple scaling and root planing (SRP) visits, and you are considering the use of a new adjunctive antimicrobial therapy; however, you are not sure how its clinical efficacy compares with that of SRP alone in reducing probing depths, increasing clinical attachment, and reducing disease progression.

In this case, the PICO components and resulting question would be built and phrased as follows:

- *P*: patient with adult periodontitis and localized persistent lesions probing >5 mm
- *I*: SRP plus minocycline HCl
- *C*: SRP alone
- *O*: reduce probing depths and disease progression and increase clinical attachment.

For a patient with adult periodontitis and localized persistent lesions probing >5 mm, will the use of SRP plus minocycline HCl, as compared with the use of SRP alone, result in a greater reduction of probing depths and disease progression, as well as an increase in clinical attachment?

INTEGRATING EBDM INTO PRACTICE AND EDUCATION

As was recommended in the first article, to have an evidence-based practice it is necessary to work together by first discussing the EBDM approach and then by incorporating the PICO process with your staff.[3] Begin by listing the patient problems, questions, or topics for which you do not have answers or complete information or for which you would like to have relevant evidence. Practice framing these questions or information needs by using the PICO formats outlined in Tables I and II. In each case, first individually write what you consider to be the problem, intervention, comparison, and outcome and then compare your answers with those of other staff members. Don't be discouraged if it takes several attempts and some lively discussion to refine the PICO elements before you have a clearly stated question. With practice, it will become second nature and enhance your problem-solving skills.

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These same recommendations hold true for an educational setting. Faculty can learn the process and integrate it into both the didactic and the clinical courses they teach. Clinical case scenarios can be used in the classroom so that students learn how to clearly state questions. This process should then be implemented on the clinic floor so that when confronted with a patient problem or a related information need, students apply and further develop their skills in framing good questions and using the EBDM process. These are important steps in reinforcing critical thinking and student-directed learning.

Several online resources review the PICO process. Three Web sites that we found helpful are:

Evidence-Based Clinical Practice Tutorial, *http://www. urmc.rochester.edu/miner/guides/ebhctut1.html*

Center for Evidence-Based Medicine, *http://cebm.jr2.ox. ac.uk/docs/focusquest.html*

Introduction to EBM, Duke University/UNC, *http:// www.hsl.unc.edu/lm/ebm/Question.htm*

DEVELOPING YOUR EVIDENCE-BASED DATABASE AND LIBRARY

Organizing the results of the EBDM process eliminates duplication of efforts, documents your methods, and enables you to have evidence at your fingertips. One suggestion is to create an evidence-based database, or "library of evidence." The PICO worksheet is the first item that you would include in the file. Other elements that you would want to include that will be discussed in future articles are the search history, selected abstracts, selected literature, critical appraisal worksheet, and article summary (including level of evidence, findings, and your recommendation based on the evidence). A brief summary of the intervention/treatment provided or decision made, the outcome, and any future considerations also should be included, if appropriate. Patient name, chart number, and other relevant demographic information also would need to be entered. Through this documentation, you can update evidence as it becomes available, identify major influences in decision making, and track different aspects of care and their related outcomes.

Again, the suggestions for practice can be applied by faculty in the courses they teach or collectively, as an outcomes database for the clinical program. For example, have students document patient problems, the PICO question investigated, and the evidence found that either contributed to or influenced their clinical decision making. Begin this process as they enter clinic and have it continue throughout their education. Creating a database would allow faculty to monitor the development of a student's EBDM and critical thinking skills, as well as to identify trends over a period of time.

CONCLUSIONS

Once you have identified a patient problem and defined your question using PICO, you are ready to find the most current valid evidence. Conducting a computerized search with maximum efficiency to answer the question is the second step in the EBDM process—and the focus of the next article in this feature series. As with asking a good question, the steps involved in conducting the search will be outlined in detail, along with a discussion of the type of question and type of evidence for which you will be searching.

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