THE QUESTION

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HOW QUESTIONS ARISE

There are two aspects to the clinical practice of dentistry. The surgical component includes all the manipulation of hard and soft tissue that is performed every day in dental practice. Examples are tooth preparation and restoration, scaling, orthodontics, and prosthesis fabrication. The other element involves decision making. The diagnosis of unlocalized dental pain, the prognosis for a periodontally compromised tooth, the choice of posterior restorative materials, and the risks/benefits assessment of third molar extractions are examples. Early in the career, decision making may be the most difficult aspect of clinical practice. There is an overwhelming array of choices with little or no structure on which to build an approach to solving the problems. As a practitioner gains experience, he or she acquires the advantage having seen the results of previous decisions, good and bad, and can recall how a problem was dealt with previously. The practitioner also develop habits that make each task easier. Habits, too, are the result of decisions made but not re-examined.

As a start, the thoughtful practitioner will ask first if there is a compelling reason to intervene for a patient, and second if there is a compelling reason to intervene at this time. The answers to these questions can be obvious or elusive. The patient who has severe, throbbing pain and tender swelling over the apex of a heavily carious lateral incisor with a large periapical radiolucency clearly needs treatment and needs it promptly. On the other hand, whether or when to treat the young patient with impacted but asymptomatic third molars is less

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obvious. With experience, practitioners build up a mental library of circumstances that can be recognized when next encountered. This is practice by pattern recognition.

Because of the infinite variety in the combinations of circumstances encountered every day, the choices made are commonly extensions of previous experiences. For example, the extension of resin-bonded prosthesis designs from the front of the mouth to the posterior segments is logical, provided provision is made for the extra occlusal load. When no previous experience is available as a guide, a knowledge of basic biologic principles can guide decision making. For example, for an edentulous patient who has had a maxillectomy, ensuring that the design for a denture includes bilateral support will guide the impression procedures.

Decision making in clinical practice thus is supported by pattern recognition when experience exists. When experience does not exist, the practitioner falls back on extensions from previous experiences or inferences from basic biologic principles. Continuing education guides and reinforces these strategies. A comfort level develops, which is the confidence one gains with years in practice.

All these approaches are molded by the single practitioner's clinical and educational exposure, that is, by one person's sample of the profession's accumulated knowledge and judgment. Because the practice behaviors of dentists are highly divergent, there is clearly great variation in each practitioner's sample of knowledge and experience. Hence, the decisions reflect different biases and knowledge gaps among different clinicians. This consequence is the problem that evidence based practice (EBP) is intended to address. The first step in EBP is to acknowledge that such gaps exist in one's personal knowledge and experience. Or as Will Rogers put it, "Everybody is ignorant, only on different subjects."

WHICH QUESTIONS?

In the flow of daily practice, virtually no decisions are made in a complete information vacuum. (Such decisions would best be made with the flip of a coin.) When there is no definitive information on a given problem, there is nearly always some influence, whether it be patient preference, the practitioner's knowledge of basic biologic principles, or the practitioner's habits. Decisions are made, therefore, without empiric information about the consequences of the decision. For example, is endodontic treatment and full-coverage restoration of a nonvital molar more cost-effective than extraction and replacement with an implant-supported prosthesis? If practitioners recognize that they do not have empiric evidence on a current problem, suddenly the practice day becomes filled with uncertainty, even for the experienced practitioner. As in medicine, this uncertainly is, in fact, the nature of dental practice. The practitioner must decide which questions to pursue in the limited time available.

Clearly, the thoughtful practitioner will seek evidence to answer

questions that directly affect patient management. Doing so is ethical practice: it puts the patient's perspective on the problem ahead of the practitioner's. The patient may want to know if chewing will be easier with a fixed implant-supported prosthesis than with an implant-supported overdenture. The practitioner, on the other hand, may be more concerned with implant survival. So, the first criterion in selecting which questions to pursue is to choose questions from the patient's perspective. The fact that the question has arisen means that it can arise again, so the second criterion suggests that practitioners seek evidence on questions that assist in staying current and in preparing for the next occasion. Often in the pursuit of this information, however, the literature does not provide a definitive answer. To ration time effectively, the third criterion suggests choosing the questions that are most likely to yield a clear answer. Of course the searcher cannot know in advance whether the answer is available to be found. Common problems, however, are more likely to have a better body of literature than rare problems. Finally, of course, the searcher should choose interesting questions that spark the learning process.

WHY BOTHER?

For the Patient

As noted previously, the patient's questions and the practitioner's questions are not always the same. Articulating the question makes it more likely that the practitioner's quest for scientific information will correspond with the patient's perception of what is important. Thus, there is better opportunity to include in the question issues that balance the potential for good with risk of harm. Similarly, the question should reflect the patient's wishes and priorities, concerns about costs, and cultural issues. An implant-supported fixed reconstruction cannot be done for an edentulous patient without significant surgical procedures and considerable discomfort and cost over a prolonged period of time. The patient should expect that the additional discomfort, costs, and time taken will yield a worthwhile extra benefit in terms of comfort, chewing efficiency, and appearance beyond conventional dentures. In addressing these concerns, the practitioner can easily be sidetracked into surrogate outcomes that do not provide a direct measure of success for the patient. For example, in the landmark 15-year report of implant success by Adell and others,[1] the authors reported rates of continuously stable prostheses as high as 100%. Significant numbers of patients, however, had to be reoperated on as many as three or more times to maintain continuous prosthesis stability. Although reoperation is less common now, implant treatment is still not without such risks, and they may be of primary concern to the patient. A clearly articulated question that probes such issues focuses the treatment priorities for the patient and assists the provider in offering appropriate counsel on the potential for harm.

For the Searcher

The most direct approach to finding the answer to a clinical question is to telephone a colleague and ask. Doing so doubles the sample of knowledge and experience that is brought to bear on the problem. Given the variety of practice decisions that are made worldwide, however, this sample is still is unimpressive. There remains, also, the specter of the blind leading the blind. With the availability of easy access to the worldwide literature, there is now no reason why that vast resource of information cannot be applied to the individual clinician's patient problem, other than the clinician's inability to use it effectively. So perhaps the clinician should waste no time in getting to the literature to hunt down the evidence. The problem with this approach is that numerous articles will likely be found that seem to address the clinical issues. As a result, time will be wasted going through them to find the one that deals most directly with the issues and provides the strongest evidence. Thus, for finding the best evidence, there are two advantages to taking the trouble to articulate a carefully crafted clinical question. One relates to efficiency in constructing a search, and the other relates to reviewing the found titles as quickly as possible.

By carefully crafting a question, the searcher learns to be more specific. The search terms selected for the search become more specific and thus are more likely to exclude concepts that are peripheral to the central point. More precise selection is likely to influence the choice of outcome measure, that is, the result desired by the patient or the outcome the patient seeks to avoid. When these issues are articulated carefully, the search terms will yield a smaller number of articles whose titles and abstracts must be reviewed individually.

Similarly, a carefully crafted question provides criteria against which found articles can be reviewed for closer inspection. As the titles and abstracts of articles are scanned, the searcher is asking, "Do I want to read this article in detail?" If the answer is no, the searcher wants that answer quickly, to be able to proceed to the next article. Having the criteria enunciated clearly in the question facilitates a quick judgment. Here again, the choice of outcome measures is often critical. Articles that address the same problems as those being researched using the same interventions but recording different outcomes are of general interest but are not necessarily relevant. Being able to ascertain quickly that the outcome reported is not the outcome of interest allows the searcher to move on to the next article more quickly.

Another advantage of articulating a clearly defined question can be found in the communication between cooperating providers. In referring patients to specialists, general practitioners can focus the attention of the specialist and at the same time circumscribe the specialist's responsibility. It therefore is easier for the general practitioner to fulfill the duty to coordinate specialist services.

Finally, a significant benefit of taking the trouble to frame clinical questions is the opportunity to organize the questions for later reference.

Lee et al[6] suggest the development of critically appraised topics (CATS) that form a personal library of answers to clinical questions that have arisen. Of course, such a library needs to be updated from time to time, but it serves as a starting point for future searches and at the very least provides a compendium of accumulated best evidence on issues already encountered.

TYPES OF QUESTIONS

To fill the knowledge gaps, the busy practitioner needs a strategy to yield the greatest return in information in the least amount of time. The earlier questions relating to unlocalized pain, periodontally involved teeth, posterior restorative materials, and third molars are vague. They do not define what the practitioner really wants to know about those issues.

Sackett et al[9] suggest that a searcher might want to obtain either *background* information or *foreground* information. Background information relates to a general understanding of a disorder, test, treatment, product, other matter. For example, questions such as, ''What is the wear rate of this posterior composite material?'' or ''What are the nerve pathways responsible for unlocalized pain?'' are background questions. These questions usually have two components. They start with who, what, where, when, why, or how and a verb that connects them to the item of interest.

Foreground questions, on the other hand, are more specific and relate to the management of the patient. For example, ''In patients with unlocalized dental pain, is a cold test more sensitive than an electric pulp test in identifying a pulpitis?'' or, ''In patients with asymptomatic impacted third molars, will removing the teeth cause greater loss of bone support at the distal of the second molars than not removing them?'' are foreground questions. These questions usually have four components: (1) a population; (2) an intervention; (3) an alternative intervention; and (4) an outcome (the result of the test, treatment, or exposure).

The patient is a member of a population that is usually described by demographics, diagnosis, symptom, or exposure. The patient, for example, may be a man in his fifties, who is a smoker, with a complaint of loose teeth. Some of these factors may be irrelevant, but the relevant factors are the features that define the population of interest. An intervention describes the action being considered, which usually is a diagnostic test, a treatment, or an exposure. The alternative intervention serves as a reference against which the test or treatment of interest is compared. One might, for example, compare fixed implant-supported prostheses against implant-supported overdentures. Finally, the outcome is the result sought from the test or treatment or the unhappy event one wishes to avoid, such as a diagnosis of apical periodontitis, or chewing efficiency, or implant failure.

At any time the searcher may need answers to both background and foreground questions. As students, practitioners asked many background questions to learn the biologic principles, disease processes, and properties of materials. Experienced practitioners, dealing with all the combinations of circumstances encountered in practice, are more interested in practical management issues that need to be specifically defined.

Framing a Question

An example illustrates the usefulness of framing a clinical question as an aid to retrieving an answer quickly.

> A dentist saw his edentulous patient on annual follow-up 2 years after inserting fixed, implant-supported prostheses. The patient complained of discomfort at one of the implants in the mandible. On examination, the implant was found to be loose and had to be removed. The clinician now is unsure whether the prosthesis can be expected to continue to function on the four remaining well-distributed implants. The alternative is to tell the patient that the remaining implants are too few to support the prosthesis. Preservation of the remaining implants may require that new implants be inserted and the prosthesis be remade or at least heavily modified. This alternative is an invasive, costly, and time-consuming solution that the patient seeks to avoid. The patient asks the dentist if he is more likely to lose his prosthesis if he continues to function with just four implants.

The clinician converts the patient's problem into a question: "In edentulous patients with fixed implant-supported prostheses, is the risk of implant failure greater when it is supported by only four implants than when it is supported by more implants?" The population is made up of edentulous patients who have implant-supported prostheses. The intervention in this case is an exposure to the use of just four implants. The alternative is the use of more implants (with the obvious implications for surgery, cost, time, discomfort, and so forth) The outcome is implant failure, which could be defined in many different ways. These phrases of the question will directly steer the choice of terms in the search strategy and the assessment of the found titles.

HOW A QUESTION STEERS A SEARCH

Specific Definition of Search Terms

Using the concepts defined in the question, the clinician searches MEDLINE by first entering the term *edentulous* as a descriptor of the patient population. The software maps the term to "jaw, edentulous" and "mouth, edentulous," both of which describe the situation of concern. The next term to enter describes the population in more detail, that is, those having an implant-supported prosthesis. This term maps

to several Medical Subject Heading (MeSH) terms that describe this patient, including "dental prosthesis, implant-supported" and "dental implants." These terms are relevant to the problem, so both are selected. Exposure to four implants sounds like a narrow circumstance that could not be easily generalized in a search of the literature. Because the situation of four implants is of interest, however, the number four could be entered as a text word. The search software will then look for all occurrences of the word four (and words containing "four") in the titles and abstracts. Finally, the searcher enters a term describing the outcome measure, which is "implant failure." The software maps this term to "prosthesis failure." Combining all these terms yields no information in the current database. Repeating the search in the 1993–1996 database yields five articles that may answer the patient's question.

Skimming Titles and Abstracts in Found Literature

The clinician now wants to scan the found titles and abstracts quickly to identify the best one or two articles that are most likely to answer the patient's question. Here, again, the details of the question facilitate the process. Each title (and abstract, if necessary) is scanned, and the content is compared with the population, maneuvers, and outcomes articulated in the question.

Of the five titles found in the search, the first is a case series by Leimola-Virtanen[7] that followed four implants in the mandibles of 39 patients for 3 to 10 years. Implant and prosthesis success rates are provided. This article thus seems to address the patient's question quite closely, except the prostheses used were denture prostheses, not fixed prostheses. In addition, being a case series, the article offers no control against which to compare the success rates found in the patients with only four implants. This article therefore is not a strong piece of evidence to use in answering the patient's question.

The title of the next article, by Jemt and Lekholm,[5] seems to deal more with varying amounts of remaining bone. Nothing is said about the number of implants or prosthesis type used. A quick check of the abstract against the criteria in the question confirms that this article will not help answer the question.

The title of the third article describes a study by Brånemark and others[2] that compares the use of four implants against six implants in edentulous patients. By the title alone, this article seems to satisfy two of the criteria specified in the question. A check of the abstract reveals it to be a study that uses a cross-sectional design that provides a control group to assess the success rates in the four-implant group against a control group with more implants. This article thus provides much stronger and more focused evidence of the implant and prosthesis success rates that could be expected when only four implants are available.

The fourth article by Zarb and Schmitt[10] provides a title and abstract

that are too vague to identify the details of either the maneuvers or the outcomes. With the relatively focused article by Brånemark et al available, there seems little value in retrieving this article and reading it in detail.

Finally, the title of the fifth article, by Jemt and others[4] suggests that the article deals with overdentures exclusively and thus is not relevant to the patient's problem.

This review of the found titles has revealed an article that seems to address the practitioner's question directly and provides a study design that permits useful comparisons of success rates to support an answer to the patient. Although the evidence is not compelling (the study is not a randomized trial), it is the best available evidence that bears directly on the question. The patient can thus be informed that leaving his prosthesis to function on four implants is unlikely to pose greater risk of implant or prosthesis failure than there was when there were more implants. The patient is thus spared the time, cost, and discomfort of further implant surgery while avoiding any extra risk of failure.

SUMMARY

This exercise of isolating the strongest article from the found titles should take no more than 1 to 2 minutes. Thus, the whole process of searching for the best evidence should take no more than 5 minutes. In medical practices where evidence based practice is done routinely, this process can be completed in less than 1 minute.[8] Obviously, the evaluation could not have been made as expeditiously without the benefit of the specific details articulated in the question. The question focused the search terms and expedited the identification of the strongest evidence that directly addressed the patient's problem from among the found titles. It provided the dentist with good (but not compelling) evidence to support an answer to the patient. It also provided the dentist with a new piece of information to use the next time the problem of reduced implant support comes up. The dentist has thus enjoyed the satisfaction of quickly identifying new knowledge and the confidence that comes with its use. In addition, the information has provided the dentist with a small but important block against the deterioration of clinical judgment skills.

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