WHAT IS EVIDENCE BASED DENTISTRY?

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The volume of literature and lectures directed at the modern dental practitioner has created some problems. How does one resolve the often contradictory information? How does one determine what is a cutting-edge technique and what is useless? In resolving a clinical decision, evidence rather than empiricism should dictate treatment. Evidence based dentistry (EBD), based on the concepts developed at MacMaster University, presents guidelines to determine the validity of study results and whether they can be applied to clinical practice.

The foundation for evidence based practice was laid by David Sackett who has defined it as “integrating individual clinical expertise with the best available external clinical evidence from systematic research.”

Evidence based dentistry supplies guidelines to help the clinician make an intelligent decision. In and of itself, EBD does not give definitive answers. It does not exchange the tyranny of the expert for the tyranny of the literature. As Sackett’s definition states, EBD relies first on clinical expertise. This expertise is especially critical in dentistry, where the number of randomized, controlled clinical trials and prospective cohort studies is limited. In a perfect world, full of quality prospective studies, one would only have to pull up a well-performed meta-analysis or systematic review of the evidence on the clinical question to solve the problem at hand. Unfortunately, these studies are too few, and clinicians must apply the best available evidence to make a decision.

The Cochrane Collaboration, an international nonprofit organization whose goal is to make up-to-date, accurate information on the effects of health care available worldwide, has an Oral Health Group that has produced some systematic reviews. Their web site (http://hiru.mcmaster.ca/cochrane/default.htm) is an excellent place to see what the evidence based dental practice in the future will be like.

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The internet has made it easy to initiate an evidence based practice (see article by Felton on page 45 of this issue). Guidelines for EBD are applicable to peer-reviewed literature and also to publications and lectures that provide a case report or, at best, a case series done under conditions that may not be similar to those seen in the average dental office. Armed with the tools of EBD, the clinician can readily evaluate the mass of data and choose, in an educated manner, what to use and what to discard.

Unfortunately, most of what is seen in dentistry is product testing done in laboratories, not operatories. The studies are usually univariate analyses, because the researcher has been trained to homogenize the study so that only one variable is tested. Clinicians, however, live in a multivariate environment. For example, an in vitro study on a dental cement might deal with retention of castings on extracted teeth. Retention, however, is not the only variable that a clinician evaluates in choosing a cement. A clinician must also be concerned with postoperative sensitivity, film thickness, setting time, working time, longevity, ability to clean up, setting expansion, and so forth. One might also wonder how good the retention would be in a clinical milieu where isolation, crevicular fluid, saliva, and intraoral humidity become confounding variables. Clinicians, seeing only one variable tested, should be reluctant to change their cement based on the limited laboratory study. Needed instead are controlled, long-term clinical trials to help clinicians make decisions, but such studies are expensive and require a long time to supply the information. Chambers questioned whether “there is clinical evidence showing that this restorative material will last longer in patient’s mouths then it will be on the market” (see article by Chambers on page 29 of this issue).

Using EBD is quite simple: 3

1. Create an answerable question.
2. Track down the best evidence to answer the question.
3. Critically appraise the information.
4. Apply the results to one’s patients.
5. Evaluate one’s performance.

The Journal of Prosthetic Dentistry has published a series similar to the User's Guide to the Medical Literature specific to dentistry, to help appraise the information. Although the guidelines differ for the different clinical question being asked, certain characteristics pertain to all studies.

THE USE OF EVIDENCE BASED DENTISTRY IN DETERMINING THERAPY

Was the Assignment of Patients to Treatment Randomized?

Randomization eliminates allocation bias. In theory, randomization ensures that variables, over which the study has control and the un-
WHAT IS EVIDENCE BASED DENTISTRY?

known variables that come in to play in all studies, are equally distributed among the test groups. To ensure equal distribution, the study population (N) must be sufficiently large. A randomized controlled trial (RCTs) is considered the optimal research design and is the reference standard for most clinical questions. Not all RCTs, however, are properly planned and carried out. The reader must still examine the methodology. Also, as Sackett concluded, “some questions about therapy do not require randomized trials (successful interventions for otherwise fatal interventions) or cannot wait for the trials to be conducted. And if no randomized trial has been carried out for our patient’s predicament, we follow the trail to the next best external evidence and work from there.”

Feinstein has questioned the blind faith often put in randomized trials and has suggested that prognostic stratification is critical to the utilization of the data. He maintains that if data are to be evaluated in prognostic subgroups, those subgroups should be identified, where possible, before the study starts, and that subjects should be allocated to those subgroups before they are randomly allocated to treatment. For example, in a study on implants in which the site (anterior mandible versus posterior maxilla) is a major variable, it would be sensible to identify the site before randomizing to ensure that chance alone does not place most of the anterior mandibles in one group and most of the posterior maxillae in the other. Another potential confounder would be smoking. Although it would be unwieldy, if not impossible, to identify every possible variable, certain dominant ones known to affect the outcome of the therapy should be identified at the start of the project.

**Were All Patients Who Entered the Trial Properly Accounted For and Attributed For at its Conclusion?**

It is critical that all patients who enter a trial are properly accounted for at its conclusion. It is not enough to say that a certain number of patients dropped out. One must include the dropouts in the statistical analysis (see article by Clive on page 137 of this issue). The most common reason patients drop out of a therapy trial is because they are unhappy with the therapy. Some subjects die, and some move out of the area, but the number in these categories should be relatively equal in the control and test groups. If the drop-out rate exceeds 20%, the clinician should be concerned about the external validity or generalizability of the project.

**Were Patients, Their Clinicians, and Study Personnel Blinded to Treatment?**

*Blinding* means that someone was not aware of the treatment being rendered. *Double-blinded* means that both the evaluators and the patients...
were unaware of the therapy being rendered. Blinding is easily done in a drug trial in which the pills look and taste the same and the patient is identified only by a code number unknown to the evaluator looking at the outcome. Blinding can also be easily done in a study of toothpastes or mouthwashes. It is not always possible to blind a clinical trial. For example, in a study comparing implant-retained overdentures with either two or four fixtures in place, it would be impossible to blind the patient or the researcher if intraoral examinations were necessary. Although a nonblinded trial is not ideal, it can still be an excellent experiment that can generate usable, reliable data.

**Were the Groups Similar at the Start of the Trial?**

To ensure validity, it is critical that the cohorts (groups) be similar in all pertinent demographic, medical, and dental factors. Although in a large study randomization should ensure equivalence, it is the investigators responsibility to assess equivalence among cohorts in detail.

**Aside From the Experimental Intervention, Were the Groups Treated Equally?**

Anything one studies, one alters. Patients who agree to participate in a study tend to be more compliant than the average. Knowing they are to be examined may cause them to exercise better home care before presenting in an effort to please the investigator. It is tempting for investigators to recall a test group more often when the outcome is uncertain or side effects are suspected. Co-interventions, such as an extra prophylaxis, can affect the primary outcome being examined and the validity of the study. All groups need be treated equally.

**Were All Clinically Important Outcomes Considered?**

The reader must decide whether all clinically important outcomes have been considered. If, for example, in evaluating a new cement for ceramic restorations, the investigator reports only that the restoration was in place after the time of the study, it is obvious that other important considerations have been ignored. If the investigator also evaluates postoperative sensitivity, film thickness, setting time, working time, longevity, ability to clean up, setting expansion, and so forth, the important clinical factors have been evaluated. More commonly, the investigation might evaluate only two of the factors. Some clinicians would find the study adequate; other readers might not. An implant study, for example, might speak of prosthesis stability and neglect the number of implants
remaining. If six implants were placed and three were lost, the prosthesis might be stable, but the clinician has cause to question the data.

**Was Follow-up Sufficiently Long and Complete?**

Too often a study is not long enough to be valid to the clinician (chronology bias). Although a 1-year follow-up may be sufficient in a study of the efficacy of tetracycline-impregnated cord, the same follow-up time is not adequate in a study on a new composite resin restoration. For restorative procedures, a minimum of 3 to 5 years may be necessary to convince a dentist to change therapy.

**Were Objective and Unbiased Outcome Criteria Used?**

Outcome criteria are chosen by the investigator, and it is easy to err by choosing an assessment that best serves the theory of the investigator. The adage, “I would not have seen it if I didn’t believe it,” readily comes into play. Picture a study that compares a Lexus with a Yugo and chooses the following criteria for the study:

- Does it have an engine?
- Does it have a radio?
- Does it have four wheels?
- Does it have windshield?
- Does it have seat belts?

Using these criteria, one concludes that the Lexus and Yugo are similar. Any rational person, however, clearly sees that results based on questionable outcome assessments are useless. In more sophisticated studies, such a flaw may not be so obvious.

**Will the Results help Clinicians in Caring for Their Patients?**

The critical question for clinicians is whether the results will help them provide better care for their patients, because that question involves all the others. If the methodology is good, if the statistically significant results have clinical relevance, and if the data interpretation is rational, one would lean towards accepting the study. If, however, the population is not representative of a clinician’s practice or if the inclusion and exclusion criteria do not match the practice population, clinicians should be hesitant about applying the results to the population they are treating.³
USING EVIDENCE BASED DENTISTRY TO EVALUATE THE NEED FOR A DIAGNOSTIC TEST

Was There an Independent, Blind Comparison with a Reference Standard?

A gold (reference) standard is important. In histopathology, the biopsy is considered the gold standard, but even the biopsy does not result in 100% agreement among pathologists. The disagreement is magnified when the pathologists are deprived of the clinical findings supplied by the surgeon. If a reference standard exists, one might question the need for the new test. If the test cannot offer the advantages of being less expensive, or less invasive, or easier to perform, one should question its use. Unfortunately, often there is no reference standard, or the reference may be controversial. Lack of a suitable reference standard does not mean that the new test is not useful, but a heavier burden of proof is demanded from the investigator, and the clinician must exercise more caution.

Were the Methods for Performing the Test Described in Sufficient Detail to Permit Replication?

If the reader cannot perform the test, it is of no use.

Were Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value, and Likelihood Ratios Presented?

It is not the reader’s responsibility to undertake statistical analysis when reading an article. Rather, it is the researchers’ obligation to supply the appropriate data (see article by Brunette on page 87 of this issue). Because EBD puts the onus of decision making on the clinician, readers must be familiar with the terms so they can determine if the new test would have merit in their practices.

Will the Patient be Better Off as a Result of the Test?

Routine testing, if it does not affect the diagnosis, prognosis, or treatment, has questionable value. If the results do not potentially change the course of treatment, the test is unnecessary. A patient who fell and knocked out the coronal portion of a tooth would benefit from a radiograph to determine the extent of the fracture but not from a pulp test to determine vitality. An adolescent with an ulceration from biting the cheek would be better served by a reexamination in a week rather than by a biopsy.

Evidence based dentistry will surely be abused.4 Insurance compa-
nies have already developed evidence based care policies that require dentists to prove that patients need the services.\textsuperscript{3} The possibility of abuse does not mean that dentistry should reject EBD. Indeed, dentists have been practicing EBD, in part, for many years. When clinicians tell patients to brush and floss, they do so because the evidence supports the efficacy of these interventions. When dentists advocate fluoride, they do so because the evidence supports its efficacy. Although many areas of dental practice are supported by numerous high-quality research projects, many more areas are supported only by anecdotal data. Hence, the validity of the data and who evaluates it become critical. Aurbach\textsuperscript{4} has questioned:

\begin{quote}
"Who will be the anointed one or group that determines which evidence is valid? Who will set the research agenda and determine where the results will be maintained? Who will validate the research? Who will maintain the data base to make sure that it is up to date? How will the results be used?"
\end{quote}

It is obvious that to control the data, clinicians need to own it. If clinicians are not sophisticated enough to force good research practices by their ability to evaluate and reject poor science, they will be at the hands of third parties who can use dubious research as justification to control clinicians’ practices. The sooner dentistry as a profession universally embraces EBD, the sooner the profession will command the use of research and prevent its misuse.

**WHAT EVIDENCE BASED DENTISTRY IS NOT**

Evidence based dentistry is not a veil to mask the same old, inadequate research. It is disturbing to see lecturers invoke EBD and present the same anecdotal lectures they gave before, with different slide titles. As the profession of dentistry becomes more sophisticated, researchers and lecturers will be forced to grow also. Evidence based dentistry does not take the clinical decisions out of clinicians hands and put them into the hands of the literature. In fact, the opposite is true. Evidence based dentistry gives guidelines for the clinician and relies first on clinical expertise.

Evidence based dentistry does not mean that third parties will control dental practices. In fact, educated dentists, understanding the literature, will be able to prevent the misrepresentation of data by commercial interests.

Evidence based dentistry does not mean the clinician need not study basic and dental material sciences. In fact, the opposite is true. To evaluate the research presented, clinicians need a solid background on which to base their evaluations and decisions.

Evidence based dentistry does not mean clinicians abandon everything they learned in dental school. It does not force clinicians to go backwards to justify things the profession universally accepts.
WHO BENEFITS FROM EVIDENCE BASED DENTISTRY

- The ultimate beneficiaries of EBD are members of the public, who will reap the rewards of better care. The internet allows patients, as well as professionals, access to health care information. The public, however, does not have the tools to evaluate the data adequately and must rely on their educated dentists to help sort fact from fiction. Patients will be more educated, more involved in their treatment decisions, and more appreciative of quality care.
- Dentists, who will also benefit from EBD. Instead of conducting free product testing for dental product manufacturers, practitioners will have at their disposal more valid research on which to predicate their clinical decisions.
- Researchers, who will benefit by being called upon to do the clinical testing necessary before new products are placed on the market.

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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
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 uncertainty 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 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\textsuperscript{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\textsuperscript{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 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, 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 Bränemark and others 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 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 Bränemark 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 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. 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.

References


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THERAPY

Anecdote, Experience, or Evidence?

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How does a practitioner determine what therapy to use? Often, the decision depends on the age of the practitioner and the experiences gained in practice. The younger practitioner depends mainly on what was taught in dental school. All dental schools have a core technique, usually derived by faculty consensus, that allows a student to develop competency in one approach to a therapeutic problem. Trying to teach a novice multiple techniques usually results in the student’s mastering none. Educators have agreed that teaching one technique well allows the student to enter practice and satisfy the needs of the public. Unfortunately, dental schools have been unfairly criticized as teaching outdated and often unrealistic techniques. This criticism is not true. Dental school faculty almost universally teach time-tested and scientifically sound procedures. Ethics dictate that patients in dental schools be protected and not subject to whimsical trends in treatment. Internal review boards mandate that research be structured to ensure the patient’s rights are preserved. The clinician, unencumbered by such constraints, often makes forays into other treatment modalities, some successful, others disappointing. Once in practice, the clinician is influenced by observations based on experience. Such observations, however, are often flawed, and associations thought to be causal are instead, only casual. Anecdotal evidence from colleagues may mold decision-making. With the broad communication now possible using with the internet, such anecdotes may come from a continent away and from a completely unknown...

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person. Conversely, upon graduation some clinicians become comfortable with a particular procedure and may be wary of change.

As clinicians expand their knowledge through lectures and by reading journals, they constantly modify their clinical methods. There is always a new restorative material on the market, a new surgical technique, a new piece of equipment, a new toothbrush, and a new toothpaste. Detailers joke that dentists are gadget enthusiasts who buy a product, use it once or twice, and store it in some cabinet, finding it years later and not remembering when, where, or why it was purchased.

How do practitioners decide which treatments to use? Often, they are influenced by the prestige of the professor giving the lecture or writing the article. All too often, however, they are seduced by the show rather than by the science. Multiple projectors, enhanced digital presentations, or the glitz of the advertising become the main reasons for change. Companies market directly to the public who, with inadequate ability to evaluate the hype, pressure the practitioner to change therapy, often with inadequate research to justify the change.

An example is a patient with an edentulous area who presents with the request for implants. What the patient is really saying is, “I want teeth.” It is the practitioner’s responsibility to understand that the patient is requesting the ability to chew better, speak better, or look better. It is the practitioner’s responsibility to determine the best therapy for that individual patient and to advise the patient of that therapy and any other suitable options. Another example is a patient who, having heard all the hype on tooth bleaching, requests the procedure when the problem is really recurrent decay around old, severely stained composite restorations that need replacement.

Any procedure involves some risk, and increasing risk usually accompanies more complex therapy. The practitioner should decrease that risk as much as possible without unduly burdening the patient. Patients have a moral, ethical, and legal right to know the risks and benefits of any therapy that is recommended.

Today, information may be obtained from a variety of sources. There are often newer procedures to supplant the approaches documented in textbooks. Reports in peer-reviewed journals are more current, depending upon the source and the publication delays. Today, many practitioners obtain information over the internet, through conversations with other practitioners, and through newsletters and non–peer-reviewed periodicals and journals. These less scientific sources can be useful. For example, the problems of root fracture when cementing dowels and the fracture of porcelain complete-coverage restorations when using the first-generation resin/ionomer cements were first made public in these forums. Regardless of how information is obtained, anyone seeking newer approaches to improve the delivery of dental service must apply the rules of evidence in evaluating a suggested technique. Failure to consider all aspects of a therapy have sometimes proven disastrous (e.g., the teratogenic effects of thalidomide) or merely ineffective after encouraging initial results (e.g., early treatments for