

Users' Guides to the Medical Literature: I. How to Get Started

[The Medical Literature]

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CLINICAL SCENARIO

You are a primary care physician inspired by a recent editorial in JAMA about lifelong learning [\[1\]](#). You decide to use some of the time you normally take for continuing medical education conferences for "practice-based education" tailored to your own practice. You begin by setting aside 2 hours every week to read about relevant clinical problems.

It is now Friday morning and you have 2 hours to spend in the hospital library. You review a one-page list of questions you have generated from the patients you've seen in the prior week. Your questions include these: What should you tell a 33-year-old woman with migraine headaches who has asked for a prescription for sumatriptan after reading a magazine article about it? Should you be screening older men in your practice for prostate cancer? What should you tell the mother of a 6-month-old boy who had a febrile seizure about his risk of developing epilepsy? Should you try to reduce a 25-year-old asthmatic man's reliance on inhaled beta-agonists? What should you tell a 50-year-old menopausal woman asking about hormone replacement?

INTRODUCTION

This series of articles will help you translate the results of medical research into clinical practice. We've written them from the perspective of the busy clinician who wants to provide effective medical care but is sharply restricted in time for reading. We do not attempt a course in research methods; the series is about using, not doing, research. It is designed to help provide our patients with care that is based on the best evidence currently available--"evidence-based medicine" [\[2\]](#). Evidence-based medicine emphasizes the need to move beyond clinical experience and physiological principles to rigorous evaluations of the consequences of clinical actions. Knowing how to use the clinical literature is imperative for ensuring we are providing optimal patient care.

In this article we will present a general approach to using one's clinical reading time effectively and some specific suggestions for deciding which clinical articles to read. In subsequent articles we will go into more detail on how this approach can contribute to solving clinical problems in the treatment, prevention, diagnosis, and prognosis of disease.

NEED FOR THE USERS' GUIDES SERIES

Clinical information comes from two principal sources, the individual patient and research. To provide effective care, both types of information are needed. Information about the individual patient is elicited through a careful history, physical examination, and other investigations. The ways in which clinicians obtain information from scientific research is less clear, but of no less importance to the quality of care that patients receive.

To the extent that clinicians rely on community standards or opinion leaders to guide their practice, there is an implicit assumption that their needs for scientific information are being met through these means; ie, that community standards and the recommendations of clinical experts (opinion leaders) reflect the best available scientific information. However, the ways in which experts' opinions and "standard practice" evolve are complex [\[3\]](#). Variation in clinical practice, comparisons of practice with evidence-based standards, and evaluations of the recommendations of clinical experts suggest that expert opinion and "standard practice" do not provide adequate mechanisms for the transfer of scientific information into clinical decision making [\[4,5\]](#). Expert opinion often lags far behind the evidence and is not infrequently inconsistent with evidence [\[6\]](#). This is not to say that expert opinion may not be important and useful, but it is clearly not sufficient.

The Editorial accompanying this article, the first of a series, reviews the reasons why clinicians need tools to evaluate and use the medical literature in their day-to-day clinical practice [\[7\]](#). This series is designed to fill that need.

For reasons of both logic and efficiency, we have sought

uniformity in presentation of the Users' Guides by organizing each set into three basic questions:

1. Are the results of the study valid?
2. What are the results?
3. Will the results help me in caring for my patients?

Yes and no are often not adequate answers to these questions. This may contrast with readers' intuitive approach. After all, the Users' Guides are designed to help clinicians make decisions, and most clinical decisions are black and white; for example, we either start a treatment or we do not. It is understandable, therefore, that we seek black or white answers from the clinical literature. The article is right or wrong; the treatment works or it does not; the results apply to my patient or they do not. Unfortunately, evidence comes in shades of gray. Often, results may be valid, perhaps demonstrate an important effect, and might improve patient care.

The goal of the Users' Guides presented in this series of articles is to help clinicians sift through these shades of gray and make appropriate decisions, recognizing the "level" of certainty (or strength of inference) underlying those decisions. The first key question--"Are the results of the study valid?"--and the last--"Will the results help me in caring for my patients?"--reflect the need to make a decision, despite the fact that the strength of the inferences that can be made based on a study spans a spectrum from strong to weak. Since this is a series on how to use research in taking care of patients, not how to do research, we will focus on flaws in study design or implementation that are most likely to weaken the strength of inference in ways that seriously distort clinical decisions based on them.

In the remainder of this article, we will introduce strategies for (1) framing clinical questions that are pertinent and answerable, (2) tracking down articles, and (3) deciding which articles to read, and which to believe.

ASKING QUESTIONS THAT ARE PERTINENT AND ANSWERABLE

Clinical questions arise continuously in the course of providing routine medical care, but must be clearly formulated to ensure clear answers. Most clinical questions can be formulated in terms of a simple relationship between the patient, some "exposure" (to a treatment, a diagnostic test, or a potentially harmful agent), and one or more specific outcomes of interest, as shown in the following modifications of the questions from the scenario at the beginning of this article:

- Would sumatriptan (exposure) reduce the severity of headache pain (outcome) in this woman with frequent migraine attacks (patient)?--a question of therapy.
- Would a prostate-specific antigen test (exposure), if performed in this symptomless elderly man (patient), decrease his risk of dying from prostate cancer (outcome)?--a question of secondary prevention through early diagnosis.
- Does the febrile seizure (exposure) that this 6-month-old infant (patient) just had increase the likelihood that he will develop epilepsy (outcome)?--a question of prognosis.
- Do beta-agonists (exposure) increase the risk of death (outcome) in this asthmatic man (patient)?--a question of harm.

The importance of such focused questions can be quickly assessed, and priority given to problems that are seen routinely and have practically important consequences. In general, those questions that are clearly related to a clinical decision about whether to use a therapeutic, preventive, or diagnostic intervention are the ones that warrant the most time. Focusing the question clarifies the target of the literature search and permits use of the appropriate guides for assessing validity in screening the titles and abstracts of the articles that are located.

For example, the question posed in the scenario at the beginning of this article about hormone replacement, while likely to be important in most primary care practices, is not well focused. It is worthwhile to clarify the type of patient and the outcomes of interest before beginning to look for an answer. Is the woman seeking treatment for hot flashes or is she asymptomatic? If the woman is asymptomatic and is wondering if she should take

estrogen to prevent osteoporosis, clinically important outcomes that might be considered include hip fracture, cardiovascular disease, breast and endometrial cancer, and vaginal bleeding. In this case, a good approach might be to start by looking for published clinical practice guidelines instead of tracking down the evidence for each outcome. Later in this series we will present guides for how to critically appraise practice guidelines.

TRACKING DOWN ARTICLES

Having posed a pertinent, answerable clinical question, you can proceed to track down the best available evidence. There are four routes for doing this: asking someone, checking reference lists in textbooks, finding a relevant article in your own reprint file, and using a bibliographic database such as MEDLINE. Asking a colleague or consultant is highly efficient, and makes most sense when the question concerns an exposure or treatment or patient you are unlikely to encounter again. If a recent textbook is at hand (published or updated within the previous year), you can follow your reading of the appropriate passage by checking the references cited by the author. Because a textbook is only as up-to-date as its most recent reference, all are at least partly out-of-date even before they are published. A new type of "subscription" textbook addresses this problem by providing periodic updates and often cites the evidence used in making its changes [\[8,9\]](#). While frequent updates help protect against being out-of-date, they do not ensure that the conclusions of the clinical experts writing textbook chapters are valid. Prototypes of textbooks that are based on systematic reviews of validated evidence are available for obstetrical [\[10\]](#) and neonatal problems [\[11\]](#), but most textbooks and review articles do not qualify as scientific overviews [\[12\]](#).

A third starting point may be an article in your personal reprint file. Since the amount of time required to maintain an up-to-date file of clinical articles is formidable, you are unlikely to have the key article at hand. New methods for retrieving the current medical literature are rendering personal filing systems nonessential, if not obsolete.

The final route, conducting electronic searches of the medical literature, is fast becoming a basic skill for practicing modern,

evidence-based medicine. Electronic access to MEDLINE is readily available in North America in a variety of on-line and CD-ROM formats. Clinicians can easily acquire the basic skills [13] and learn to retrieve the same number of relevant citations as librarians, even if their searches remain a bit messier [14]. The addition of structured abstracts to MEDLINE and the development of databases that have screened articles for their validity and clinical relevance, such as the Oxford Database of Perinatal Trials [15] and an electronic version of the ACP Journal Club, promise to make the task of retrieving information from the medical literature even easier. You can seek a review article (often the best place to start) by adding, to whatever Medical Subject Heading (MeSH) terms are used to identify the disorder and "exposure," in your MEDLINE search, the search term REVIEW (PT) (PT stands for publication type). You are more likely to find a methodologically sound review article by using the term META-ANALYSIS (PT) instead of REVIEW. Another potential place to start is with practice guidelines, which now have their own search term PRACTICE GUIDELINE (PT). Recruiting a librarian to help you with your first few searches may help you learn to avoid searches that are too broad and unfocused, or too narrow and thus risk missing key articles. Increasing numbers of physicians are finding that MEDLINE searches can help them solve clinical problems and improve patient care and clinical outcomes [16].

DECIDING IF AN ARTICLE IS LIKELY TO PROVIDE VALID RESULTS

The first question applied to any article tracked down in an effort to find an answer for a clinical problem concerns its closeness to the truth: are the results of this article valid? The [Table 1](#) presents two key guides to assess validity for primary studies (those that provide original data on a topic) and integrative studies (those that summarize data from primary studies). For each type of integrative study, the first criterion has to do with whether the question is appropriately framed, and the second with whether the evidence was appropriately collected and summarized. The clinician can use these most important criteria to rapidly screen an abstract to determine whether it warrants the additional time required to read it in detail. The busy clinician who has tracked down a number of articles on a question can use the guides to choose the one or two

articles most likely to provide a valid answer. These criteria can also be used to reduce the clinical literature to a manageable size when trying to keep up with new advances that are pertinent to one's practice. If a more detailed review of an article's methods reveals that these "validity" guides are met, readers can turn their attention to the other guides designed to help them answer the next two key questions: what are the results and will they benefit my patient care?

Primary Studies	
Therapy	<ul style="list-style-type: none"> • Was the assignment of patients to treatments randomized? • Were all of the patients who entered the trial properly accounted for and attributed to the treatment?
Diagnosis	<ul style="list-style-type: none"> • Was there an independent, blind comparison with a reference standard? • Did the patient samples include an appropriate spectrum of the test of patients to whom the diagnostic test will be applied in clinical practice?
Harm	<ul style="list-style-type: none"> • Were there clearly identified comparison groups that were defined with respect to important determinants of outcome (other than the one of interest)? • Were outcomes and exposures measured for the entire range of the groups being compared?
Progress	<ul style="list-style-type: none"> • Was there a representative patient sample at a well-defined point in the course of disease? • Was follow-up sufficiently long and complete?
Integrative Studies	
Overview	<ul style="list-style-type: none"> • Did the review address a clearly focused question? • Were the criteria used to select articles for inclusion appropriate?
Practice guidelines	<ul style="list-style-type: none"> • Were the actions and outcomes clearly specified? • Did the guideline use an explicit process to identify, select, and combine evidence?
Decision analysis	<ul style="list-style-type: none"> • Did the analysis follow a model of clinically important decisions? • What valid evidence was used to develop the baseline probabilities and utilities?
Economic analysis	<ul style="list-style-type: none"> • Were two or more clearly described alternatives compared? • Were the expected consequences of each alternative based on valid evidence?

*Each of these guides makes an explicit or implicit reference to "important" tests to evaluate the validity of the studies that they are intended to produce that negative answer. The validity criteria are used in making this evaluation would depend on the data being subjected to them. Diagnosis, prognosis, or harm, and are those that are presented in the rest of the table dealing with primary studies.

Table 1. No caption available

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CONCLUSION

Subsequent articles in this series will describe strategies for efficiently selecting and using each of the types of articles in the [Table 1](#). In doing so, they will describe the justification and application of guides for determining whether the results of an article are valid and applicable to the clinical decisions you must make.

Readers should be warned that the guides do not come with definitive answers. Learning to apply them can be challenging. However, it can also be extremely gratifying. More important, it is only by translating good evidence into good clinical decisions that we can be sure that we do more good than harm for our patients.

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