KEEPING CLINICALLY UP-TO-DATE

Evidence-Based Approach to the Medical Literature

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A physician who does not use books and journals, who does not need a library, who does not read one or two of the best weeklies and monthlies, soon sinks to the level of the cross-counter prescriber, and not alone in practice, but in those mercenary feelings and habits that characterize a trade.

William Osler¹

Keeping up with medical information is a daunting task. There is so much to know—6 million new articles per year, not to mention all the information that we once learned but forgot, or never knew and now need to find. Clinicians work under growing expectations that they know all the best and latest information—both from patients, who now, by their own initiative, can outdo their doctors in areas of special interest to them, and from the organizations doctors work in, which increasingly track patterns of care. Also, less time is available to invest in keeping up-to-date. No wonder, therefore, that keeping up with medical information can be an uncomfortable task, especially for generalists who must cover such a broad field.

But there is also a positive side to the current situation. Never before have there been such vast amounts of valid information and such rapid, powerful ways of finding it. For example, one can access the world's best and most up-to-date health information for travelers by dialing a single number. A journal now selects and summarizes for us, by explicit criteria, the world's scientifically strong, clinically important research articles in internal medicine.

The ability to find the right clinical information is not God-given, or even necessarily learned in medical school. To benefit from modern ways of managing medical information, clinicians must develop an explicit plan and specific skills. A strong research base for how clinicians do and should keep up is not available. The following is our approach, based on experience as clinicians and editors with a special interest in critical appraisal of the medical literature.

COPING WITH MEDICAL INFORMATION

Clinicians find one way or another to cope with information, so they can carry on with their practices. The question is not *whether* they cope but *how*. It is all too easy for keeping up with information to become a frustrating, ad hoc, come-from-behind part of medical practice. Dysfunctional ways of coping with information include relying only on pharmaceutical representatives, advertisements, "throwaway" journals, and what was learned in medical school. Worse, the clinician may give up reading altogether. Even though they enjoy many aspects of being generalists, some clinicians may choose to narrow their practices to be sufficiently comfortable with their grasp of knowledge in their field. On the other hand, when information management is properly arranged, this aspect of practice can be efficient, fun, and empowering.

Basic Principles

Standards for Feasibility

Any workable way of fulfilling the information needs of very busy clinicians must meet very high standards. It must be simple and rapid (measured in minutes at most), and deliver the information at the time it is needed for the care of patients. The information found must be concentrated, because clinicians in the midst of patient care cannot afford the inefficiency of sorting through unwanted information to find what is relevant. Finally, it must be accurate, because the stakes are high both for patients' lives and for society's resources. The total plan should take into account that physicians do have larger blocks of time outside the clinical setting to deal in more depth with some of their information needs that do not require immediate answers.

Clinicians' information needs are different from those of researchers. Most traditional information systems (such as libraries and MEDLINE) have been developed for the latter and meet their needs well, but may have limited relevance to the busy clinician.

Basic Skills

To manage their information needs, clinicians must develop three basic skills: *finding* potentially relevant information, *filtering* out the best from the much larger volume of less credible information, and *judging* whether to believe the information that remains.

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Finding. Vast stores of clinically relevant information are available through print media and an array of electronic sources. All that is required is the technical skill and effort to gain access to it. Paper sources (mainly books and journals) are familiar and are the predominant medium of communication. Electronic media are increasingly useful and user-friendly and have the theoretical advantages that space is not an important limitation, they can be updated frequently, and related information can be found in a large body of text by means of powerful searching software.

The standard for what is the best medium is simply what works best for the individual user. Clinicians should be open to new methods but not feel compelled to use sources that genuinely do not work well for them just because they are more modern and have theoretical advantages. As long as it is available, that the information is trustworthy and relevant is more important than how it comes to the user.

Filtering. Most articles are not an appropriate basis for clinical decisions because they are scientifically weak (for example, a case report when clinical trials of the same question are available), report laboratory research not yet ready for clinical application, or are only intended to share ideas without supplying data to support them. Often one or a few articles carry more information than all of the other articles on a question put together. For example, one large randomized, controlled trial on the effectiveness of fecal occult blood testing in preventing death from colorectal cancer² carries more weight than a host of case series, descriptions of the sensitivity and specificity of the test, and arguments for why this preventive strategy should work. The challenge is to find the few pivotal articles among the much larger number of useful ones. If we have only a limited amount of time to consider the evidence base for a decision, why not spend it on the source that contains the most information?

Judging. Having found the best information on a clinical question, the clinician must then judge whether or not it is a sufficiently strong basis for clinical decisions. Assessment of validity is often delegated to a trusted colleague or to the editors and peer reviewers of a respected journal. Although for practical reasons we rely on this approach, it is not without risk. All of us, including experts, have biases. Journals do improve the validity of reporting of clinical research, but even after peer review and editing, articles in respected peer-reviewed journals remain imperfect.³ Therefore, clinicians must rely on their own critical appraisal skills, both to delegate this responsibility wisely to others and to judge the results of some articles for themselves.

Useful but Potentially Biased Sources

Colleagues

Colleagues are the predominant source of information in practice.⁴ The most familiar, accessible, efficient

way to obtain information is from other clinicians. But the information so obtained is only as good as the colleague who provided it. How does one choose the right adviser? There is a human tendency to believe in people with credentials (such as those with highly specialized knowledge), seniority (someone with gray hair or a professorship), or conviction (how could they be so sure if they are not right?). All are only indirectly related to validity.

People with specialized knowledge are susceptible to biases, just like the rest of us. For example, gastroenterologists' and radiologists' opinions on the respective value of colonoscopy and barium enema may be colored by making a living doing one and not the other procedure. Specialists may also believe strongly in the value of their work, apart from money. They may know what is right for their practices but have difficulty understanding what would be right for the primary care setting. For example, the positive predictive value of a test may vary 10,000-fold from one practice setting to another; a diagnostic strategy that is appropriate in a teaching hospital emergency department may be silly in a primary care practice.⁵ Therefore, information from colleagues must be taken with gratitude but caution.

Throwaway Journals

"Throwaway" (controlled circulation) journals are sent to clinicians unsolicited and free of charge, and are not sponsored by professional societies. These journals are often attractive and informative, published by masters of design and layout, and written by prominent academic physicians. However, clinicians should view information in throwaway journals with caution.⁶ The publishers have a primary, commercial interest in attractiveness, not validity. Their main purpose is income from pharmaceutical advertising. These journals are a livelihood for their owners, paid for by advertisers, and are produced without the checks and balances on content that come from peer review or ownership by a professional organization (such as the Society of General Internal Medicine or the American College of Physicians) that has a reputation for integrity at stake. Articles may shy away from the complex or unpleasant, even when these are essential parts of the topic. There are no safeguards against overstating claims of benefits, perhaps of a drug made by a sponsor.

Advertisements and Pharmaceutical Representatives

Advertisements' and salespeople's work is to persuade, not inform. We are in a capitalist society, and most of us believe there is nothing in principle wrong with selling. It would be misleading, however, to take advertisements as a primary source of information about drugs or devices. In one study of advertisements in leading medical journals,⁷ experts found that 32% of the headlines misled readers about efficacy, 40% did not balance information on efficacy with that on side effects and contraindications, and 44% would lead to improper prescribing if the

physician had no information about the drug other than that contained in the advertisement. In a study of pharmaceutical sales representatives, 11% of statements about drugs were inaccurate.⁸

INFORMATION NEEDS AND HOW TO MEET THEM

Remaining Familiar with the Full Scope of One's Field

General medical journals provide an entree to all of the dimensions of medicine, to be enjoyed on a regular basis. The information base for clinical medicine includes not only the results of original, scientific research, but also the ideas, personalities, feelings, politics, history, and social context of medicine and the personal experience of being a doctor.

Clinicians' use of journals is affected by powerful feelings—unfortunately, many of them uncomfortable. We are brought up to respect journals and feel we should be reading them regularly. But in practice journals often accumulate without being read, building to intimidating piles that cause guilt and frustration. These feelings are shared by medical students and senior physicians alike. We must get past this distressing and dysfunctional situation, lest it last a professional lifetime and rob us of part of the joy of medicine.

Our trouble with journals comes partly from an unrealistic view of what it means to "read" a journal. None of us has the time to read journals word for word, cover to cover, issue after issue. Rather, we must visit with the journal in the time we have for it, adjusting the depth to which we approach each article according to our interest and its relevance to our practice. For some articles we might read only the title, for others the title and abstract, and for still others the introduction, key figures, and tables. Some articles, perhaps only a few per year, are so important and controversial that we should read and digest them in depth, so that we can form our own opinions about their validity. Understanding the main point of research and review articles is aided by structured abstracts, which make explicit the elements of the articles that we would want to have to judge their validity and understand their main results.⁹ A working knowledge of the principles of critical appraisal (clinical epidemiology) is the basis for these judgments and for understanding journal articles efficiently.

Readers should make an explicit decision, based on a rationale they can live with, about the relative proportion of journal reading time to spend on original research articles versus reviews. Reviews are the more efficient way to keep up with medicine, and they do put the contributions of individual articles in context. But traditional reviews are digested information, derived from the original research and following it by months to years. One would always be a step behind, and at arms length from the primary source of our information base, without a healthy interest in, and experience with, reports of original re-

search. So whatever the proportions, one should save some time for reports of original research.

Keeping Up with Scientific Advances

We were brought up to believe that if we kept up with a few leading journals, we would encounter most of the important new information. But if this was ever true, it is not so now. True, the scientifically strong, clinically relevant original research articles do occur in highest concentrations in a few journals (in internal medicine, *The New England Journal of Medicine*, *Annals of Internal Medicine*, *JAMA*, and *Archives of Internal Medicine*, in that order).¹⁰ However, these articles as a whole are widely distributed across many journals, at least three dozen.

Figure 1 shows the proportion of all such articles that one would encounter by reading the journal with the highest yield, the two with the highest yield, the top three, and so on. One who read 11 journals regularly would still have seen only 80% of the scientifically strong, clinically relevant articles in internal medicine in the world's literature.¹⁰ It is impossible for an individual clinician to peruse all of the journals in which important articles are found. It follows that if one is to keep up with the best articles, one must delegate part of this responsibility.

Review Journals

ACP Journal Club fills this need. Its editors review more than 30 journals and select scientifically strong, clinically relevant articles by explicit criteria, which are summarized in each issue of the journal. Each article is summarized by a structured abstract and published with a brief commentary by an expert in the content area, which puts the individual article in context. In this way, a medical literature of more than 6 million articles per year

FIGURE 1. Cumulative percentage of all scientifically strong, clinically relevant articles in internal medicine found in individual journals. (Source: Haynes RB. Where is the meat in clinical journals? *ACP J. Club*. 1993;119[suppl 3]:A22-3.)

is reduced to approximately 300 key articles, well within the reading capabilities of any serious clinician. A variation on *ACP Journal Club* called *Evidence-Based Medicine* adds articles in family medicine, pediatrics, and other disciplines relevant to generalist clinicians to a selection of those from *ACP Journal Club*.

Some clinicians prefer other abstract services, such as *Journal Watch*, *The Practical Medicine Letter*, or the updates sent each month to subscribers of *Scientific American Medicine*. Articles in these review publications are brief and to the point. The main disadvantage is that the reader must simply invest faith in the editorial staff's judgment of what is and is not valid and worth including, without actually knowing the criteria for these judgments (as one does for *ACP Journal Club*). In any case, which method of surveillance a clinician prefers is less important than that he or she finds a credible means of keeping up with new information and uses it regularly.

Continuing Medical Education

Some clinicians prefer to take their updates all at once, apart from the preoccupations of day-to-day practice. Continuing medical education courses and yearbooks may suit their needs. Although there is rigorous, national oversight of the structure and process of courses (such as credentials of faculty and sponsoring institution, and the presence of learning objectives, handouts, and a course evaluation), and the sponsoring organizations have incentives (both earnings and reputation) to make the course popular, attendees are not well protected against presentations of content that are idiosyncratic and biased by the presenter's particular views.

Journal Clubs

Journal clubs are a local, collective effort for clinicians, on their own initiative, to keep up. They usually take one of two forms. The older, traditional form is to use journal club meetings to keep up with new information. Individual attendees briefly summarize the contents of several journals, so that dozens of articles are covered in the session. Attention is mainly on results, and there is little time for critique of validity. The other, more modern way is for one or a few presenters to choose the most important articles published in the interval since the last meeting and to lead the group in an in-depth critique of the validity of the methods, clinical importance of the findings, and generalizability to local practice. Although both are useful, the latter has a special place in the intellectual life of a community of physicians, encouraging them to think that some articles are much more important than others and that even the best are imperfect.

Looking Up Common Facts

Clinicians often need to look up information that they should have known but never did, knew but forgot, or think they know but are not sure, so they want to confirm it.

Textbooks

Paper-based textbooks are the most convenient source of such information. Wonderfully relevant and useful texts for office-based general internal medicine now exist. Clinicians familiar with one or two of them can find what they want quickly. Textbooks are especially good for topics that have not changed much in recent years—for example, clinical diagnosis of the acute abdomen or palpation of the thyroid gland.

Textbooks are limited sources of information in fields that are changing rapidly, however, as is the case currently with the management of HIV infection, peptic ulcer disease, type II diabetes and diabetic renal disease, and acute coronary ischemia. Information in textbooks is typically about a year old before it is even published, and authors tend to be cautious about including recent information for fear it will not stand up during the years the textbook will be used. *Scientific American Medicine* is updated every month, but any one section is updated much less frequently. Electronic textbooks, such as UpToDate, are now being developed and have the potential to overcome this difficulty. All the contents of electronic textbooks can be updated frequently, typically every quarter, though most textbooks now available in electronic form are updated no more frequently than the parent, paper-based book.

Review Articles

Journal review articles are a useful way of getting up-to-date on a clinical issue if, for the question at hand, the clinician can find a review that is recent and credible. Traditional reviews, in journal articles and textbooks, are common sources for looking up basic facts. They are familiar and widely available. Their main disadvantage is that there is little explicit structure for how the evidence is gathered and presented; authors have wide latitude in how they search for the relevant research articles, which ones they include, how they weigh results when they differ, and why they conclude what they do. Validity and balance depend mainly on the integrity of the authors and the diligence of peer reviewers and editors.

In both textbooks and traditional reviews, recommendations may be well behind the best available scientific evidence in a field. In one study, for example, thrombolytic therapy for acute myocardial infarction began to be recommended in textbooks and reviews more than a decade after several randomized trials, singly and together, had established beyond reasonable doubt that the drug was effective.¹¹ On the other hand, textbooks and reviews, being the work of one or a few authors, may offer more aggressive advice than the medical community as a whole would support. In the same study,¹¹ prophylactic lidocaine was recommended in textbooks and reviews years before any randomized trial of its effectiveness had been published and continued to be recommended in some sources 20 years after all of several randomized controlled trials had suggested it did more harm than good.

In recent years, a new approach, "systematic reviews," has been developed to summarize concisely the best evidence from original research on a specific question. These reviews apply "scientific strategies that limit bias to systematic assembly, critical appraisal, and synthesis of all relevant studies on a specific topic."¹² The rigor of their methods protects readers from some of the biases of traditional reviews—or at least makes the scientific basis for conclusions more explicit. They are especially useful when strong studies of a clinical question are available but the answer to the question remains disputed because the studies come to different conclusions. In the best, authors have searched all the world's literature for completed studies (whether or not they were published), selected the few that are scientifically strong (for questions of the efficacy of treatment, for example, randomized controlled trials), and summarized their individual results (both estimates of effect and precision of those estimates). The strength of individual studies can be related to their conclusions to see if lack of validity explains disagreement¹³; this has not been very helpful so far, perhaps because there is typically a high standard for including studies in the first place.

Meta-analyses are a subset of systematic reviews, especially useful when individual studies are small. A common problem with small studies is imprecision in the estimate of effect, which can result in effect sizes that are unstable from study to study, differing in both magnitude and direction by chance alone. If the studies are sufficiently similar (in patients, intervention, and outcome), the authors can develop a summary estimate of effect for all the studies taken as a whole, treating individual studies as if they were building blocks for one large study, the contribution of each depending on its size (statistical precision). Results can be pooled as each new study becomes available (a "cumulative meta-analysis"), showing the point in a succession of studies over time at which the studies as a whole provide a persuasive result.¹⁴

All in all, the authors of systematic reviews have done an enormous amount of spadework for the rest of us. They have identified the strong studies, summarized their results, and given us the references. Even if we do not choose to accept their conclusions from the data they have assembled for us, they have brought us a long way, and we can develop our own conclusions.

ACP Journal Club on Disk

It is now possible to search by topic among articles abstracted in *ACP Journal Club* since its inception in 1991. The contents, along with searching software, are available on diskette. With this database, one can find the best recent original research articles on a clinical question in internal medicine.

Guidelines

At their best, clinical practice guidelines are based on syntheses of the best available information on a clinical question, akin to good reviews, which are presented with

the guidelines themselves. Although many guidelines are sponsored by respected societies, and invite the user's belief in their credibility in the name of the organization, they vary widely in quality. The best are recommended by panels representing a breadth of perspectives (such as generalist and specialist clinicians, epidemiologists, economists, social scientists, and patients), base recommendations on scientific evidence using explicit criteria (not expert opinion or usual practice alone), and take into account cost, patient and provider preference, and other practical issues bearing on the clinical policy (such as local availability and expertise) as well as effectiveness. A proposal for structured reporting of guidelines, calling specific attention to these and other issues on which credibility of the guideline is based, has been published.¹⁵

It is difficult for a clinician to keep up with the growing number of clinical practice guidelines. The American Medical Association has assembled a large but incomplete list, and the Agency for Health Care Policy and Research has plans to offer comprehensive lists.

The Internet

The Internet,¹⁶ and especially the World Wide Web, is, in the words of a recent *New York Times* headline, a "vast mountain of gems and junk." Extraordinarily useful information is posted—MEDLINE, contents of journals, databases on treatments, descriptions of providers, dialogues among patients, and much more (Table 1).¹⁷ But most of it is difficult to locate unless one has spent time working out where it is or gets useful advice from someone who has. Also, the Internet is by its very nature open, unregulated, and nonrestrictive. As a result, it is all too often difficult to know by what authority, and with what guarantees of validity, assertions are made. It may also be difficult to know whether the information is as current as its presence in an on-line electronic system suggests it is. For now, the best approach is to give the Internet a chance, expect more from it as time passes, and beware of the absence of safeguards to validity of the sort built into more familiar sources of information such as peer-reviewed journals and guidelines from national organizations.

The Cochrane Collaboration

The Cochrane Collaboration may soon be a useful source of up-to-date, comprehensive, and synthesized information of therapeutic interventions.¹⁸ Scholars throughout the world are taking responsibility for searching the world's literature on therapeutic interventions for specific conditions and summarizing the best articles, mostly randomized trials. These summaries and a current synthesis of the information contained in the articles as a whole are available electronically to anyone who subscribes. The concept has extraordinary power, and when a sufficient number of conditions are covered, the Cochrane Collaboration could transform our present struggles to obtain the best currently available information on a clinical question.

Table 1. Some Useful Internet Addresses (March 1997)

Agency for Health Care Policy and Research <i>Clinical Guidelines</i>	http://text.nlm.nih.gov/ahcpr/list.html
Centers for Disease Control <i>Vaccine Guidelines</i> <i>Traveler's Information</i> <i>MMWR</i>	http://www.cdc.gov
National Cancer Institute <i>Cancer Information</i>	http://cancernet.nci.nih.gov
National Library of Medicine <i>Finding information on medical topics</i> <i>Health Hotlines: 800 Numbers</i>	http://www.nlm.nih.gov/index/medindex.html
MEDLINE <i>Internet Grateful Med</i>	http://igm.nlm.nih.gov

Looking Up Obscure Facts

Some facts are urgently needed on occasion, but clinicians cannot and should not commit them to memory because they are too numerous and rarely needed. Examples include algorithms for adjustment of drug doses in renal failure, antibiotic sensitivities for uncommon microorganisms, information for international travelers, the effects of the thousands of potential exposures in the workplace, and the addresses of help groups for patients with specific conditions such as ostomies or migraine.

The information is available (see Appendix). The challenge is to assemble a set of sources that are readily accessible in one's own practice setting. Some of this information is available through local resources such as the poison control hotline, pharmacy, and laboratories of the local hospital. Other sources are widely available through booklets, telephone, fax, and the Internet. Sometimes this information is strikingly easy to obtain. For example, the world's best and most up-to-date information on health protection for international travelers is available by a single telephone or fax number at the Centers for Disease Control and Prevention. Similarly, a list of toll-free numbers for health information is available from the National Health Information Center (see Appendix) and in the AT&T Toll-Free National 800 Directory in many libraries.¹⁹

Some useful sources of information may be too expensive for an individual clinician to afford but feasible if several subscribe together. For example, PDQ, published by the National Cancer Institute, summarizes current information on cancer chemotherapy, trials, and consultants and makes it available electronically. Clinicians who are not oncologists but care for patients with cancer need to have access to this information. If they band together, they can afford to have it.

MEDLINE

Relatively user-friendly electronic access to MEDLINE is widely available through a variety of vendors, such as Grateful Med and Paper Chase, and is offered as part of a

larger package from the American College of Physicians and commercial packages for access to the Internet.

MEDLINE has a special, limited place in the information needs of clinicians. It is just what is needed for looking up clinical presentations, side effects, or treatments of uncommon conditions. Through MEDLINE one could find whether neuropathy has ever been reported following administration of mefloquine, or whether impotence has been reported in patients taking newer antihypertensive medications. MEDLINE is not, however, especially useful to busy clinicians. It is designed to sort by content area (such as tuberculosis or rheumatoid arthritis) and by question (such as diagnosis or treatment) but is relatively clumsy in sorting by scientific strength. As a result, searches tend to produce long lists of citations of various quality—or, if one tries to deal with this by restricting the search, to miss important articles. That is, the search terms for scientific quality tend to be neither specific nor sensitive. Adding search terms for research design, such as randomized controlled trial, can help.¹⁹⁻²¹ For the researcher who has time and must be familiar with all research in a field, MEDLINE's value is incontestable.

Judging the Results of Research for Oneself

Articles in the major peer-reviewed journals have passed through an extraordinarily extensive and careful process intended to improve them relative to the original, submitted manuscript, and manuscripts are improved in the process.³ Nevertheless, articles, even in the most prestigious journals, are far from perfect when they are published. Readers must take personal responsibility for judging the validity and clinical importance of the information for themselves. As with any aspect of medicine, this will go better if the reader has a structure for doing so and does not only rely on native intelligence and clinical experience. For example, the validity of a study of a potential risk factor depends on how well the study has dealt with the characteristic strengths and weakness of cohort and case control studies. Readers need to under-

stand the concepts represented by terms such as “confounding,” “odds ratio,” and “confidence intervals.”

Continuous improvement in judging the validity and generalizability of clinical research can be fostered over a professional lifetime by discussing the strengths and weaknesses of research methods with colleagues in journal clubs, attention to the rationale for comments in editorials, the discussion sections of research articles, and commentaries such as those in *ACP Journal Club*, as well as through textbooks (of “clinical epidemiology”), journal articles about research methods themselves (see Appendix), and courses. Structured abstracts help readers quickly find the key elements they need to assess the validity and generalizability of research findings.⁹

Holding One's Own with Well-Informed Patients

Patients now have access to the same information their doctors have—through books, magazines, medical journals in libraries, 800 numbers, and the Internet and World Wide Web. As a result, an interested patient may assemble a great deal more information on a specific condition than the patient's physician has. In a celebrated example, immortalized in the movie *Lorenzo's Oil*, parents of a child with the rare, inherited disease adrenoleukodystrophy used the National Library of Medicine to review the world's literature and suggest a treatment to their child's doctors. Ironically, the actual effectiveness of the treatment is now in doubt.²²

Research results may be reported in the popular media and read by patients before their physicians have seen the article itself, because their copy of the journal has not arrived yet, they have not had a chance to read it, or they do not get the journal at all. This situation distresses many physicians. A service to send daily broadcasts of the medical news covered in the popular media, Medical News Network, was recently established but could not find sufficient financing. Currently no remedy exists for this problem. Physicians must either keep up with popular accounts themselves or find a graceful and constructive way of dealing with patients who, for the moment, know more than they do about some medical information.

Physicians should bring other strengths to discussions with patients who are well armed with the “facts.” They understand better than most patients the clinical

context in which research observations are made, the strengths and weaknesses of specific research studies, and the scientific basis for how individual studies build or weaken the case for cause and effect. Physicians should develop these skills and bring them to bear on the information patients have acquired rather than try to match their patients in mastering all the assertions, right or wrong, that have been reported about a clinical problem.

SYNTHESIS: AN INFORMATION PLAN

Clinicians should actively manage their own information needs and not, as is so easy to do, just react from day to day. Otherwise they may drift into less effective and satisfying ways of coping with their information needs than they could have for the same investment of time and energy.

Table 2 suggests elements of a complete information plan. We each should think through how our individual needs can be met under the specific conditions of our practices and personal lives. This is an ongoing project, not one that can be settled at one point in time and then not revisited. It cannot be dealt with effectively without setting aside some high-quality time to replenish information stores and invest in future success. The availability of information is changing rapidly, and so it is necessary to invest time specifically in discovering whether new sources, such as the Internet or electronic textbooks, have become useful to us.

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Table 2. Elements of an Information Plan

1. Browse at least one general journal regularly
2. Maintain surveillance on new information
3. Establish reliable ways of looking up common facts
4. Identify a set of ways to look up obscure facts
5. Develop critical appraisal skills
6. Set aside high-quality time regularly to deal with information needs
7. Invest time to discover new sources of useful information

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ANNOUNCEMENT

American Board of Internal Medicine

Important Note: The Board offers all of its Subspecialty Certification Examinations annually in November.

*1997 ABIM Recertification Examinations in Internal Medicine,
its Subspecialties, and Added Qualifications*

Registration Period: Ongoing and continuous since July 1, 1995
Final Examination Date: November 19, 1997

The Board's new comprehensive Recertification Program consists of an in-home, open-book Self-Evaluation Process (SEP) and a proctored Final Examination which will be administered annually in November. In order to be eligible to apply for the November Final Examination, Diplomates must return all their required at-home open-book SEP Modules to the Board office by August 1, 1997 and must submit their recertification Final Examination application by September 1, 1997.

For more information and application forms, please contact:

Registration Section
American Board of Internal Medicine
3624 Market Street
Philadelphia, Pennsylvania 19104-2675
Telephone: (800) 441-2246 or (215) 243-1500
Fax: (215) 243-1590 E-mail: request@abim.org

APPENDIX

Information Sources

Critical Reading Skills

1. Fletcher RH, Fletcher SW, Wagner EH. *Clinical Epidemiology: The Essentials*. 3rd ed. Baltimore, Md: Williams and Wilkins; 1995.
A basic textbook written for clinicians and organized by clinical questions: diagnosis, prognosis, treatment, etc.
2. Sackett DL, Haynes RB, Guyatt GH, Tugwell P. *Clinical Epidemiology: A Basic Science for Clinical Medicine*. 2nd ed. Boston, Mass: Little, Brown and Co; 1991.
A lively introduction to clinical epidemiology with special emphasis on diagnosis and treatment, by leading proponents of "evidence-based medicine"
3. Riegelman RK, Hirsch RP. *Studying a Study and Testing a Test: How to Read the Medical Literature*. 2nd ed. Boston, Mass: Little, Brown and Co; 1989.
A clear description of an approach to studies of diagnosis and treatment
4. Gehlbach SH. *Interpreting the Medical Literature*. 3rd ed. New York, NY: McGraw-Hill; 1993.
A basic introduction
5. Users' Guide to the Medical Literature Series (JAMA)
Oxman AD, Sackett DL, Guyatt GH. I. How to get started. 1993;270:2093-5.
Oxman AD, Cook DJ, Guyatt GH. VI. How to use an overview. 1994;272:13767-71.
Guyatt GH, Sackett DL, Cook DJ. II. How to use an article about therapy or prevention. A. Are the results of the study valid? 1993;270:2598-2601.
Guyatt GH, Sackett DL, Cook DJ. II. How to use an article about therapy or prevention. B. What were the results and will they help me in caring for my patients? 1994;271:59-63.
Hayward RSA, Wilson MC, Tunis SR, Bass EB, Guyatt GH. VIII. How to use clinical practice guidelines. A. Are the recommendations valid? 1995;274:570-4.
Jaeschke R, Guyatt GH, Sackett DL. III. How to use an article about a diagnostic test. A. Are the results of the study valid? 1994;271:389-91.
Jaeschke R, Guyatt GH, Sackett DL. III. How to use an article about a diagnostic test. B. What are the results and will they help me in caring for my patients? 194;271:703-7.
Levine M, Walter S, Lee H, Haines T, Holbrook A, Moyer V. IV. How to use an article about harm. 1995;271:1615-9.
Laupakis A, Wells G, Richardson S, Tugwell P. V. How to use an article about prognosis. 1995;272:234-7.
Richardson WS, Detsky AS. VII. How to use a clinical decision analysis. A. Are the results of the study valid? 1995;272:1292-5.
Richardson WS, Detsky AS. VII. How to use a clinical decision analysis. B. What are the results and will they help me in caring for my patients? 1995;273:1610-13.
A series of articles on critical appraisal of clinical research articles, offering a sound but simplified approach for beginners.

Selection of Best Published Articles

1. *ACP Journal Club*
Selects by explicit criteria the most scientifically strong and clinically relevant articles in the world's internal medicine literature and presents them as structured abstracts and commentaries (about 30/issue) in a journal published every 2 months by the American College of Physicians. (\$56/year; student rate \$35/year).
 2. *Evidence-Based Medicine: Linking Research to Practice*
Similar to ACP Journal Club but includes pediatrics, family medicine, ob/gyn, surgery, and psychiatry. Published every 2 months jointly by the American College of Physicians and the British Medical Journal. (\$75/year).
Both ACP Journal Club and Evidence-Based Medicine are available through the American College of Physicians, Independence Mall West, Sixth St. at Race, Philadelphia, PA 19106-1572; telephone (800) 523-1546 or (215) 351-2644.
 3. *Journal Watch*
Selection of best articles in major journals, summarized in a brief paragraph for each. Published in 24 issues per year as a newsletter by the Massachusetts Medical Society. To subscribe call 800 843-6356 or write Journal Watch, 1440 Main St., Waltham, MA 02154-1649. (\$89/year).
 4. *The Practical Medical Letter*
A biweekly update and commentary on new and practical clinical information for the primary care practitioner. Technomic Publishing Company, Inc., 851 New Holland Ave., Box 3535, Lancaster, PA 17604-3535; telephone (800) 233-9936, fax (717) 295-4538; E-mail: customer@techpub.com. \$79/year (24 issues).
 5. *Practical Pointers for Primary Care*
A monthly newsletter in which articles from widely circulated journals are abstracted and published with commentary by the editor. Published by Practical Pointers, Inc. Richard T James, Jr., Editor. First Charlotte Physicians, 300 Billingsley Rd., Charlotte, NC 28211. A public service publication. Duplication permitted.
 6. *The Cochrane Collaboration*
Systematic reviews of the best randomized controlled trials on specific clinical questions prepared by teams all over the world, updated regularly, and published electronically. Available through the American College of Physicians by calling 800 523-1546 ext. 2600 or 215 351-2600. Available in CD ROM and 3 1/2-inch disks for Windows and Macintosh. (\$170/year, single user).
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APPENDIX
Information Sources (continued)

Drug Interactions

Medical Letter Handbook of Drug Interactions

Summarizes adverse drug interactions, their mechanisms and recommendations for management, with references. Published by The Medical Letter, Inc., 1000 Main St., New Rochelle, NY 10801-7537.

Drug Interaction Facts. 3rd ed. St. Louis, Mo: Facts and Comparisons; 1992.

A user-friendly, clinically oriented book prepared by clinicians and pharmacists, not the pharmaceutical industry, and available in pharmacies.

Drugs in Renal Failure

Bennett WM, Aronoff GR, Golper TA, Morrison G, Singer I, Brater DC. Drug Prescribing in Renal Failure. Dosing Guidelines for Adults. 2nd ed. Philadelphia, Pa: American College of Physicians; 1991.

A handbook of facts. \$19.

Poison Information

Poison Control Hotlines at local/regional hospitals.

Hazardous Substance Data Base (HSDB) subset of TOXLINE database from National Library of Medicine.

Antibiotic Sensitivities

Sanford JP, Gilbert DN, Sande MA. Guide to Antimicrobial Therapy. 1996. Antimicrobial Therapy, Inc., 5910 North Central Expressway, Suite 1955, Dallas, TX 75206.

A handbook updated yearly and sold for \$6.25.

Information for International Travellers

CDC International Travellers' Hotline; telephone (404) 332-4559, fax (404) 332-4565.

CDC Home Travel Page on the Internet.

Can call any time for voice mail or fax of up-to-date advice for any place in the world.

Health Information for International Travel. Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone (202) 512-1800.

Published annually by the Centers for Disease Control.

World Health Organization. International Travel and Health. Geneva: WHO; 1995.

Handbook updated yearly.

Preventive Health Care

U.S. Preventive Services Task Force. Guide to Clinical Preventive Services. 2nd ed. Baltimore, Md: Williams and Wilkins; 1996.

The official U.S. government guidelines. A new version in press.

American College of Physicians. Guide to Adult Immunization. Philadelphia, Pa: ACP; 1993.

American Academy of Pediatrics. Report of the Committee on Infectious Diseases. Elk Grove Village, Ill: AAP; 1994.

American Academy of Family Physicians. AAFP Positions on the Clinical Aspects of Medical Practice. Monograph published by the American Academy of Family Physicians, Kansas City, MO; January 1993.

Eddy DM, ed. Common Screening Tests. Philadelphia, Pa: American College of Physicians; 1991.

Cancer Prevention and Treatment

PDQ (Physician Data Query).

A comprehensive database of cancer prevention and treatment, prepared by the National Cancer Institute and updated monthly. Includes treatment statements for health care professionals and patients, screening and prevention information, drug information, clinical trial protocols, and a directory of health care professionals and organizations. Available by Internet or fax to members (\$100/year).

Toll-Free Number for Health Information

National Health Information Center Referral Specialist, P.O. Box 1133, Washington, DC 20013-1133; telephone (800) 336-4797;

E-mail: nhic-nt.health.org