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Column Editor

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Rapid changes in clinical medicine place significant demands on physicians. Keeping abreast of innovations in diagnostic procedures, current guidelines, and recommendations for treatment is challenging. In addition to keeping generally up to date, physicians may also have specific daily information needs.

During any clinical encounter, a physician may be uncertain about the best answer to a clinical question. This column discusses how physicians search the Internet for answers to clinical questions and addresses the relative benefits, limitations, and time demands of 2 different information sources—Medline, an electronic bibliographic database, and *UpToDate*, an electronic textbook.

### PHYSICIANS' INFORMATION NEEDS

A survey of primary care physicians revealed that, on average, they identify 1 unanswered clinical question for every 10 patients who visit their offices for care.<sup>1</sup> They reported pursuing an answer to the clinical question about 57% of the time and finding an answer in 70% of these instances.<sup>1</sup> Factors associated with physicians' decisions to search for a definite answer to a clinical question include the urgency of the patient's problem and the perceived likelihood that an answer will be available.<sup>2</sup>

Physicians, in the survey published in 2001, reported using textbooks, consultants, drug compendia, and, less frequently, electronic resources to find answers.<sup>1</sup> As access to the Internet has become more pervasive and database availability has increased, use of Internet-based resources also has increased.<sup>3</sup> A more recent survey of physicians in New Zealand found that nearly 50% reported using the Internet to search for information related to patient care; their most common resource was Medline.<sup>4</sup>

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### MEDLINE

Medline is a large database that indexes the articles published in more than 4000 medical journals from 1966 to the present; it is the most well studied of all electronic resources.<sup>5</sup> Online access to Medline is free via PubMed at the National Library of Medicine (NLM) Web site ([www.pubmed.gov](http://www.pubmed.gov)). The disadvantage of Medline is that, despite its breadth and depth, the sheer volume of information may limit efficient searching. Searches may result in a few relevant articles hidden among a large number of less relevant articles. Another limitation is that although some journals now have full text available online (see [www.pubmedcentral.nih.gov](http://www.pubmedcentral.nih.gov)), most articles are available only in abstract form.

Research into the amount of time required for physicians using Medline to find an article or abstract related to a specific question suggests that the average search time ranges from 6 to 27 minutes.<sup>6-8</sup> Estimating that each search requires 6 minutes, that approximately 70% of searches are successful, and that approximately 40% of those have an impact on a clinical decision, it would require that a provider spend an average of 21 minutes searching Medline to impact 1 clinical decision (6 minutes/[0.7 \* 0.4] = time to impact a decision)—and could require substantially more time.<sup>19</sup> Reading an article would of course require even more time. In fact, "excessive time required to find information" is cited as one of the major barriers to incorporating medical information into the workflow of primary care practice.<sup>10</sup>

Some experts have suggested that providing additional training for physicians may result in more efficient and effective searches.<sup>4</sup> In fact, effective searching of Medline has become somewhat of a medical informatics "art."<sup>11</sup> One method for maximizing the effectiveness of Medline searching is to use the Medical Subject Headings (MeSH) index. MeSH is a select vocabulary of key words used to describe and locate articles archived in Medline and *Index Medicus*. According to the NLM, "MeSH terminology provides a consistent way to retrieve information that may use different terminology for the same concepts." For more information on using MeSH and other efficient search techniques, see the NLM tutorial at [www.nlm.nih.gov/bsd/pubmed\\_tutorial/m6002.html](http://www.nlm.nih.gov/bsd/pubmed_tutorial/m6002.html).<sup>12</sup>

### UP-TO-DATE

Some of the most recent research related to Internet-based electronic resources has focused on *UpToDate*, a medical textbook of topic reviews ([www.utdol.com](http://www.utdol.com)). *UpToDate* is produced in cooperation with several academic societies, including the Society of General Internal Medicine. In a

recent study, investigators introduced *UpToDate* to 154 second-year students who were making the transition to clinical rotations. After *UpToDate* was made available, student use rapidly increased; a total of approximately 1700 topics were investigated per week (11 topics per student per week). Of the 116 students who responded to the investigators' survey, 85% reported that electronic resources had become their primary information resource rather than paper resources: 53% vs 33%, respectively ( $P < .001$ ).<sup>13</sup> The investigators concluded that, "The current generation of medical students may be the leaders in a medical culture shift from paper to electronic resources."<sup>13</sup>

While each new topic in *UpToDate* is peer reviewed to evaluate the quality of the evidence presented, it is unclear how the rigor of the peer review process compares with that at medical journals. No external validation of the quality of evidence summarized by *UpToDate* has been conducted. Another significant limitation of this resource is that it is fee-based, whereas Medline access is free.

#### SEARCHING FOR ANSWERS

Recent surveys of physicians suggest increasing use of electronic resources, and the medical student survey results indicate a high adoption rate of electronic information resources among students. Use of these resources in the clinical setting, however, is still limited by time demands and accessibility constraints. Even with effective search strategies and use of the MeSH index, the potential for incorporating Medline searches into the workflow of clinical care is limited. No studies have yet assessed the efficiency or effectiveness of searching electronic textbooks such as *UpToDate* vs Medline. Certainly, the scope of the *UpToDate* textbook of topic reviews is limited in comparison to Medline, but *UpToDate* is likely to be more relevant when common internal medicine topics are the focus of the search.

Many other resources are available online, such as MD Consult ([www.mdconsult.com](http://www.mdconsult.com)), a digital library of medical textbooks. Some of the books can be downloaded to a handheld computer (eg, [www.epocrates.com](http://www.epocrates.com)). The availability of efficient resources that can be rapidly accessed at the point of care is increasing. Hopefully, next year, we will be able to update this column with even more evidence on the relative benefits of these Internet-based innovations.

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