

## Do You Google?

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I did my residency back in the 20th century, in an era before electronic medical records and work-hour restrictions. I drew blood and started IVs myself. An MRI was a big deal. And we used textbooks. The most accessible resource to answer questions at the time of a clinical encounter was a dog-eared copy of Nelson's or Rudolph's textbook on pediatrics. The workrooms on the wards had copies in varying states of structural integrity. Some of these texts were chained to the wall, a testament to their usefulness and tendency to disappear.

When I admitted a child who carried a diagnosis of Leigh encephalopathy or some other eponymous condition, I opened one of these texts and read a chapter. For certain conditions, I recognized when my colleagues had been reading the textbooks because the epidemiology they quoted was verbatim what I remembered from the same chapter. One of my fellow residents actually carried around a copy of Nelson's with her in a backpack along with other references believed crucial to surviving a night on call. She tended to stoop under the weight of the books on her back, giving her a characteristic posture as she wandered the halls of the hospital. I can, to this day, still picture certain images and pages. The information in textbooks was said to be 5 years out of date by the time I read it, but faculty attendings made sure I was aware of the most recent developments. Those texts, supplemented by the input of mentors, are the foundation for my knowledge of pediatrics.

I also conducted literature searches. But in those days, it was a sometimes-frustrating exercise in constructing a search strategy, generating a list of articles, handing the list to a librarian, and days later receiving a stack of articles—only to have forgotten the reason for the literature search in the first place. To this day, I appreciate the comprehensive review of a topic I can process in a short time spent with a textbook.

Now, I am a pediatric residency program director. I meet with residents on a semiannual basis to review their progress toward mastery of 6 competency areas outlined by the Accreditation Council for Graduate Medical Education.

Medical knowledge is one of these competencies. Another is “practice-based learning and improvement,” encompassing appraisal of one's own patient care and the ongoing assimilation of evidence to support practice. In addressing these competencies, I ask residents to reflect on the resources they use to teach themselves about the patients they are seeing. Almost all of them say they use UpToDate (<http://www.uptodate.com>).

For those of you who haven't personally accessed this resource, UpToDate is essentially an online textbook of medicine. The reviews of topics on the site are very much like those you find in a printed textbook. There are headers like “clinical features” and “laboratory studies.” They contain hyperlinks to figures and images. And they are, in fact, up to date. I recently looked up information on antibiotic prophylaxis for bacterial endocarditis. The UpToDate reference stated that the information on the Web site was last updated on September 17, 2007 and would be updated again in March 2008. As a point of reference, the copy of Nelson's on the shelf in my office is the 16th edition, published in 2000. Not only did it take me longer to find the information in the textbook (the index directed me from “Bacterial endocarditis” to “Endocarditis”), but the table addressing the issue of prophylaxis is referenced to the American Heart Association guidelines published in *JAMA* in 1997. On this topic, my textbook is of historic interest only. Today, anywhere there is a computer there is immediate access to the most current information available. And it is usually easy to find.

Is UpToDate as credible a reference as my reliable Nelson's? The Web site claims a rigorous peer-review process. But with 3600 authors and a pledge to update 40% of the site's content every 4 months (*every 4 months!*), I can't help but wonder just how rigorous the process is. Are standards being compromised for convenience? I now conduct literature searches using PubMed and can quickly access full-text versions of articles online directly from the publisher. But, when I want a simple answer to a very direct clinical question, I often consult an online reference such as UpToDate. Oddly, it makes me tense. I hear my past mentors telling me I could do better, that UpToDate is an expedient solution.

Although I harbor these doubts about UpToDate, my greatest fears about Internet use in medicine have been realized in my most recent meetings with residents. More and

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more of them refer to their use of Google to find information to support their practice of medicine. Google? Really? My initial reaction was distaste, a feeling that Internet use had finally gone too far.

I've used Google to learn that Hannah Montana's real name is Miley Cyrus, but should we be using this proletarian tool as a source of guidance for the care of our patients? In my imagination, I picture a resident's attempts to learn about Kawasaki disease leading to involvement in a Nigerian bank scam. ("I am sure and have confidence of your ability and reliability to prosecute a transaction of this great magnitude involving a pending transaction requiring maximum confidence.") Or I imagine patient care decisions being made on the basis of entries in Wikipedia, which proudly proclaims itself "the free encyclopedia that anyone can edit." Google output is unfiltered. It's often unreferenced. It has blogs. I acknowledge the utilitarian nature of Google but have encouraged trainees to familiarize themselves with other, more sanctioned sources of information. A gentle rejoinder.

Then, one day I was sitting in a case conference. As we debated the approach to the management of a patient, a respected colleague suggested, "Google it." This gave me pause. Had I overreacted? Perhaps my reservations about Google, born of my experience parenting teenagers, were overblown. Google is, after all, a remarkable search engine.

I went to my office and closed the door. I opened an Internet browser to Google and typed in "endocarditis prophylaxis." In 0.20 seconds, I had 61 200 hits. Most remarkable, however, was the fact that the top links on the list were references I was interested in viewing. The first was a link to patient information on the American Heart Association's Web site, dated with today's date. The others were links to information from institutions in which I have confidence—the University of Wisconsin, the University of Pennsylvania, the Cleveland Clinic. There was an eMedicine article, which, like UpToDate, is essentially a textbook review but more timely.

I have previously trusted myself to use Internet search engines, confident that I had the knowledge and experience to critically evaluate the utility of what was returned while hypocritically thinking that trainees lacked sufficient perspective to use it appropriately. Now, I had to admit that Google appeared to have something figured out. The search results included headers with hyperlinks to subsets of the search, which would be relevant to different perspectives on a topic. One for health professionals, another for consumers of health care. There is a new sense of order to this great and previously unfiltered resource. It is winning me over.

Google is accessible. It is quick. And now I know that the search results will be presented in a way that allows me to quickly select a trusted source of information, one that answers a question in the context in which it was asked. I still consult textbooks for comprehensive reviews of topics about which our understanding is not evolving rapidly (pityriasis rosea). If I am preparing a talk or have another reason for in-depth knowledge of a subject, I use PubMed to find original articles. But for topics where I have a focused interest in the most current information (this year's strains of influenza), Google is my first stop. In fact, I more often use Google than UpToDate because it more quickly directs me to primary sources, and conversely, sources that will be most helpful in conversations with my patients and their families.

On the Internet, so much information is so immediately accessible that the exercise of applying evidence to patient care has changed. My stoop-shouldered colleague no longer needs to worry about whether she will be able to find the information she needs at the time she needs it. She can discard the backpack. Information is everywhere. But how will she handle information that no longer comes from a single, iconic, and trusted text? I used to point residents to a few respected references, knowing that if they consulted them they would be basing decisions on sound evidence. Now I feel a responsibility to know what references the residents are consulting and how they are filtering the output before applying it to the care of their patients. An ironic effect of the expanded use of Internet searching is that the involvement of mentors is still critical. Someone needs to place the output of a Google search into a context that only comes with experience. Our challenge is not knowing where to find information, but knowing what to do with the information we find once we have it.

This afternoon, I had another of my meetings with a resident. As we talked about her approach to expanding her knowledge base, she told me that her computer at home had failed and that her husband often didn't return home with their laptop until very late in the evening. She described the experience of wanting to read about a patient she had seen and resorting to her copy of *Nelson Textbook of Pediatrics*. She smiled as she said, "I actually learned something!" She said she had found that sulfasalazine has been associated with a form of immune deficiency and that it was now the talk of the wards. The immune deficiency she was referring to is a decrease in circulating immunoglobulin levels. I know. I just Googled it.