Toward a Paperless Environment?

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Access to the Internet and its vast stores of data and links among sites has changed the way in which we search for and gather information. A proposal from Harold Varmus, the former director of the US National Institutes of Health, may change this process even further. The stated goal of the "E-biomed" project is to develop a single Web site that would accept papers in every area of biomedicine and provide free access to the full text for all readers.[1]

This proposal has generated considerable debate, not all of it positive and some possibly mired in conflict of interest.[2]

WHY WAS THIS PROPOSAL MADE?

There are several reasons for the E-biomed proposal, but the primary drivers appear to be speed and cost. Before the Internet, medical literature was confined primarily to journals that could be searched only by laborious review of printed copies of *Index Medicus*. Then, even after the elusive article was identified, it often turned out that the journal was on loan, at the bindery or even missing. If the journal was found, the eager pharmacist would have to copy the paper, often waiting in line for access to a copier, hoping that the binding would flatten sufficiently to allow reading of the copied text.[3]

The Internet has eliminated all of this. The World Wide Web has made it much easier to find and retrieve current articles, often before the printed version is available in one's own hospital. However, the volume of information that can be retrieved with a single key stroke has many of us begging for mercy as we desperately try to keep up. This volume of material has several sources. Numerous special-interest sites, sponsored by individuals and commercial interests, tempt the user with non-peer-reviewed and "frankly irresponsible" information.[3] The Internet is also home to e-journals and several print journals that have an Internet presence (including *CJHP*). In 1996 there were 1700 electronic serials available through the Internet. This number increased to 3400 in 1997 and 6500 in 1998.[4] The reason for this exponential increase in volume is, in many ways, tied to cost. It is less expensive to "publish" and distribute on the Web. For example, the cost to print *CJHP* during the year ending June 1999 was $542 per page of text. This works out to about $10 per issue per CSHP member, most of which is covered by advertising. The cost to publish the same information on the Internet would be about $4 per issue per CSHP member, although the prospect of recouping these costs through advertising is uncertain.

But the cost of publication is not the financial incentive driving the global E-biomed proposal. Rather, it is the perception that the publishers of research and medical journals do not add sufficient value to justify the large profits that some of them make.[5,6] Butler[1] has reported that in 1997 the US Association of Research Libraries spent an estimated 18% of their collective budget of US$2.4 billion, or about $12 000 per scientist, to buy research journals. Since most of the articles published in the journals are written and peer-reviewed by the same scientists free of charge, the publishers are effectively charging $12 000 per scientist to manage the process, design and typeset the articles, and then distribute the journals. These processes could potentially be completed on the Internet at a lower cost.[5]

IS E-BIOMED THE SOLUTION?

The E-biomed proposal could mean the end of print journals. Although this change would move us toward a faster and more cost-efficient alternative, we might be

giving up a number of subtle conveniences. The first is the permanence of the printed record. Publication on acid-free paper now preserves the scholarly record for more than 300 years, yet there is no assurance that electronic formats will preserve the content with full access "in perpetuity".[7] Second, most of us are incapable of reading, interpreting, and archiving literature exclusively on-screen. We often require a hard copy. The human condition is such that reading is often grounded in a physical object — the printed page or a book — and this context is lost when we read on-line.[8] Therefore, although we are likely searching for and finding a greater proportion of the information we seek on-line, synthesis is often done once the paper has been printed and re-read off-line. Third, who has the time at work to read all of this research at their desk? Much of our reviewing and casual reading is done away from the computer screen. Fourth, searching for the information that we desire or require is only one way in which we find the information that we use in our practice. Journals contain a wide range of information, and we often come across articles of interest only by perusing the tables of contents of several journals. Fifth, even though we practitioners may read the latest study comparing a new drug to (preferably) standard therapy or (more often) placebo, we would generally prefer to read a review that places all of the current therapies in their proper place. Good review articles of this type are rare, require considerable synthesis, and do not directly fit into the research-oriented E-biomed proposal.

SO WHERE DOES THIS LEAVE US?

These problems are not insurmountable for the E-biomed proposal.[4] Computer-compatible electronic books such as the Rocket eBook® may allow us to read electronically away from the computer. There are also some real advantages to electronic publishing, including the ability to include colour and even video at very low incremental costs. *CJHP*, however, is unlikely to become a stand-alone electronic journal for a few years. The print journal serves a valuable function, disseminating information and ideas among hospital pharmacists, regardless of Internet availability. Therefore, as with the fisherman who has one foot solidly positioned on the dock and the other in the boat that is pulling away, *CJHP* will in the coming months expand its Net-based presence, moving to make full text of the journal available on-line, while continuing to print and mail a hard copy to each member. However, this will not continue indefinitely, and it appears inevitable that *CJHP* will eventually be published on-line only. Nevertheless, I, for one, expect that this progression will not result in a paperless environment, as I find I can read and understand scientific articles only with my pen in hand and a printed page on the desk in front of me.

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