2015 — The Future of Medical Libraries

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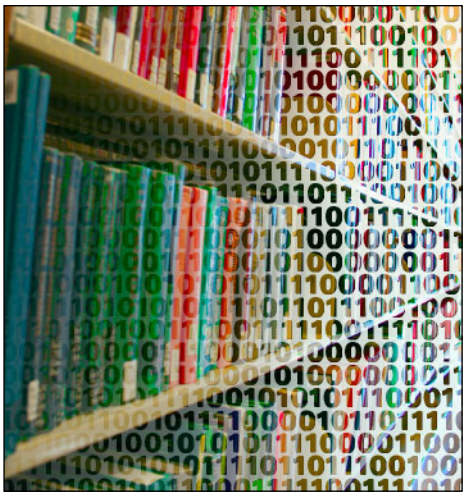
The past 20 years have witnessed computer and communications revolutions, rapid progress in genetics research, increasing public interest in personal health decisions, and corresponding expansions in the services provided by the National Library of Medicine. These concomitant and linked developments have upset the information marketplace and inspired policy debates about telecommunications, intellectual property, and access to the results of government-funded research. The Internet and the World Wide Web have transformed the way libraries deliver information services and have created perceived alternatives to libraries. What will happen to medical libraries in the post-Google world?



Today, most medical libraries exist within hospitals or academic institutions. Their primary purpose is to provide scholarly information to support health care, education, and the research conducted at these institutions. Given that scholars and researchers continue to rely on information, the work now performed by medical libraries will not disappear. But how, where, and by whom will it be done? Here is one evolutionary scenario for the medical libraries of 2015. Everything we envision exists in some form today.

In our 2015, health care professionals, patients, educators, students, researchers, and administrators expect easy access to electronic information from their homes, offices, wards, clinics, and libraries, not to mention while they are en route between these places. People use a constantly changing array of desktop, portable, and wearable computing and telecommunications devices. Most desktop machines and many portable devices support easy teleconferencing and distance education. Everyone craves access to more electronic information, no matter how much is available, but people treasure efficient methods for extracting pertinent information from the fire-hose effect of undifferentiated electronic text (and unwanted commercial offers). Most clinicians, patients, and healthy people use electronic health records. Like basic researchers, clinical researchers depend on electronic data systems. When using such systems, practitioners and researchers expect instant connection to related knowledge, including guidelines, protocols, clinical alerts, and relevant published dicta. Patients and families demand the same information that is available to physicians, nurses, and public health departments.

Despite ubiquitous access to electronic information, however, the "library as place" is still highly valued and heavily used (unless the facility is physically decrepit, outmoded, or inconveniently located). Users flock to library buildings and spaces that are attractive, centrally located, technologically current, and arranged to meet the needs of groups as well as of solitary users.[1] In addition to serving coffee, the best facilities support small-group study and larger-group training, provide well-wired space for interdisciplinary collaboration involving complex electronic data sets, and welcome those seeking temporary work space, individual assistance, or quiet places away from wards or waiting rooms. With no printed *Index Medicus* and fewer physical volumes, there is more space for people.

Our future library's "virtual" collection — the set of electronic information it makes available — is much vaster than the physical collection owned and housed in library space. By 2015, many publications are issued only in electronic form, thou-

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sands of back runs of journals have now been digitized, and electronic copies of books, manuscripts, and images abound. Many libraries store and manage access to electronic scientific and health-related data. The flood of patient-specific data generated by large-scale, prospective, normal-cohort studies presents special problems. Preservation of unique electronic content requires a serious commitment and substantial funding.

In this future, journals are still an important vehicle for disseminating peer-reviewed research results, but many individual articles have electronic lives of their own. Much scientific information is available free over the Internet — thanks in part to earlier efforts to make information about clinical trials[2] and government-funded research[3] available to the public — though many sources of electronic information require paid licenses. Greater reliance on electronic-publication standards and a mix of payment and publication models keep annual price increases relatively low.

Multimedia "digital libraries" feature rich interconnections among genetics research data, aggregated clinical and public health data, published literature, and high-quality health information in many languages. It is easy to navigate among the different levels of explanation that are useful to patients, clinicians, and researchers. Tutorials and current health news include links to information about relevant local health services and open clinical trials. Descriptions of clinical trials, in turn, link to summarized results and relevant scientific papers. Digital libraries derive much of their value from the selection, organization, analysis, and linking performed by highly skilled human beings aided by increasingly advanced software systems — in other words, digital libraries still need librarians.

National use of standards-based electronic health records provides enhanced opportunities to deliver customized information when and where it is needed. There are many "smart" programs that match relevant published knowledge to the diagnoses and circumstances of individual patients, as these are represented in their electronic records. Simple mechanisms, such as preformed expert search queries, still suffice in some contexts. The use of electronic health records also facilitates remote consultations with information specialists. For example, a physician can include a pointer to the patient's electronic record when sending a request for synthesized evidence to a clinical librarian (who is bound by the same privacy requirements as the rest of the health care team). This pointer allows the librarian to tailor summarized evidence to the specific patient. Similar approaches are used to request, document, and deliver educational materials to patients.

Unfortunately, the true integration of multimedia information is still neither simple nor cheap. Technology that supports ready, online access to full text, pictures, sound, and video continues to evolve quickly. Technology companies derive more income from selling services than from selling hardware. Decisions about telecommunications consortia (grandsons of Internet2) and the expensive "last mile" of electronic infrastructure (granddaughter of Wi-Fi) to homes, hospital wards, classrooms, and library spaces must be revisited periodically. Ensuring uninterrupted access during natural or man-made disasters is a daunting challenge. Changing user environments, information products, and licensing provisions are the norm. In 2015, a library continues to be the logical entity to manage this complexity on behalf of the institution, to make decisions about inevitable and substantial expenditures, to adapt information services to new realities, and to provide essential user training and support.

Just as access to electronic information is more pervasive, so in 2015 more librarians and information specialists are deployed "in context" outside the library to improve quality, to reduce the risks associated with inefficient or incomplete retrieval of the available evidence, and to do community outreach. Many librarians have advanced training in both subject-matter disciplines and information science. It is common to find librarians working as part of health care teams, writing grant proposals, serving on institutional review boards, working as bioinformatics database specialists within science departments, serving as faculty members in evidence-based medicine courses, and being involved in multilingual health-literacy programs and community partnerships.

Of course, ours is just one vision of medical libraries in 2015. The history of libraries, computing, and telecommunications is filled with notoriously bad predictions. In one famous example from 1977, Ken Olson, president and founder of Digital Equip-

ment Corporation, proclaimed that "there is no reason for any individual to have a computer in his home." Perhaps some of our predictions will be equally off the mark. Be that as it may, today's medical libraries have unprecedented opportunities to contribute to better quality and efficiency in health care, education, and research. Those who support and lead medical libraries should seize these opportunities. The future is in their hands.

1. Shill HB, Tonner S. Does the building still matter? Usage patterns in new, expanded, and renovated libraries, 1995–2002. College & Research Libraries News. Vol. 65. No. 2. March 2004:123-50. (Chicago: Association of College & Research Libraries.)
2. De Angelis C, Drazen JM, Frizelle FA, et al. Clinical trial registration: a statement from the International Committee of Medical Journal Editors. N Engl J Med 2004;351:1250-1.
3. Enhanced public access to NIH research information. Bethesda, Md.: National Institutes of Health, 2004. (Accessed February 24, 2005, at http://grants.nih.gov/grants/guide/notice-files/NOT-OD-04-064.html.)