Community hospitals and the Internet: lessons from pilot connections*

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Community hospitals in rural and isolated areas have had little access to the Internet. In 1992, the National Library of Medicine funded a pilot project to be conducted by the University of Washington and seven community hospitals in the northwestern United States. The goals of the project were to connect the hospitals to the Internet and study the uses made of this resource. A number of administrative, technical, financial, and organizational problems were dealt with in the attempt to establish the Internet connections and introduce this resource to these health care settings. This paper examines these issues and presents conclusions drawn from the experiences of the project team.

The Pacific Northwest region of the National Network of Libraries of Medicine (NN/LM PNR) stretches across the northern Rockies and Cascades and up to Alaska. It is the largest of the NN/LM regions in size and the smallest in population. These conditions foster both independence and interdependence among the region’s communities and libraries.

It is in this environment that the NN/LM PNR—also known as the “Regional Medical Library” (RML)—has worked with hospital librarians to connect community hospitals to the Internet, the worldwide network of computer networks. This effort has become known as the “pilot connections project.” Interconnected local-area networks (LANs) and wide-area networks are relatively common in academic medical centers but scarce in community hospitals. Plans for this project were developed in 1991/92, when the importance of the Internet for libraries and health care was beginning to be appreciated, but access still effectively was limited to academic and research organizations.

The project has been conducted in partnership with...
NorthWestNet, the midlevel regional Internet service provider for six states in the northwest. NorthWestNet is a membership-based organization closely allied operationally with the University of Washington. Member institutions pay for Internet connectivity as well as value-added services, including a sophisticated and user-friendly Unix mail program (PINE) and access to databases (e.g., the University of Washington Libraries Online Catalog and all years of MEDLINE). At the beginning of this project, NorthWestNet was one of the very few brokers of Internet access in the region. Now there are many service providers, mostly those providing dial-up online access for individuals but also including those providing full-service institutionwide access.

PROJECT SUMMARY

The project began in October 1992 and was to end in April 1994, but it has been extended one year to examine further the use of Internet resources in clinical settings. The choice of sites for this project has been documented elsewhere [1]. The seven project sites range from a 360-bed hospital not far from the Seattle metropolitan area to a 22-bed hospital in Helena, Montana. The others, in the 100- to 200-bed range, are in Alaska, Idaho, Montana, Oregon, and Washington.

Based on discussions with site staff and on inventories of the computer and networking environments at the sites, the RML project planners selected three sites for direct Internet connections, requiring installation of network hardware and software and high-speed data circuits. The other four sites were selected to test dial-up access using relatively high-speed, full-service Serial Line Internet Protocol (SLIP) connections.

Librarians from the sites were brought together for hands-on training at the University of Washington at the beginning of the project period. Although each had extensive experience using online databases, and health sciences librarians in the region used an electronic mail system, none had any experience using the tools and resources of the Internet. Besides providing two full days of training and actual online exploration, the session also brought the librarians and systems staff representatives from the sites together with the RML staff to plan the next steps.

Over the next several months, the librarians became active and increasingly sophisticated Internet users. Each became experienced in making use of the typical tools available on the Internet at that time: e-mail, remote log-in to other computer systems (telnet), file-transfer protocol (FTP), and professional discussion groups (listserv). Some of the librarians became avid explorers of the Internet very quickly; others took longer to use it frequently and began to find new uses for it on their own.

Communication between the project librarians and the RML staff was very active during this time of exploration and discovery; almost all of it was carried out through Internet e-mail. The RML staff helped the project librarians figure out how to accomplish tasks and how to find new resources. The librarians were very quick to incorporate this new resource into their normal work. The Internet soon became the preferred means of using familiar resources (e.g., MEDLINE and DOCLINE). They also quickly began to discover new resources of interest to them or, in some cases, to the health professionals they serve.

One aspect of this project has been to examine the issues involved in establishing Internet connections in community hospitals. The project team has learned a good deal about establishing connections, and this experience is reported in some detail in this paper. Another aspect has been to assess the application of Internet resources in community hospitals: Once the connections are in place, what use is made of them and for what purposes? Both of these questions will continue to be examined over the remainder of the project.

Not much is known at this point about the use of Internet resources beyond that by the project librarians. As they have become more knowledgeable and adept at using Internet resources, they often have been able to demonstrate Internet uses to interested hospital staff members. The librarians’ experiences informing and educating community hospital staffs have indicated that there are as yet too few clinically relevant resources available to convince most clinicians that this is a resource worth their time and that use of the Internet for professional and personal communication is a much more immediate attraction than other uses for many in these settings. But use of the Internet to send e-mail to a son who is away at college may be an effective way to introduce a clinician to information resources that can help in treating patients.

As of April 1994, nineteen months into the project, two of the three direct connection sites only recently had begun to function at a minimal level. The four dial-up access sites had been limited to low-speed online access. The reasons for the delays and limited service are examined in the following sections.

LESSONS LEARNED

The issue of Internet access for hospitals has appeared again and again on MEDLIB-L (the Internet’s health sciences library electronic discussion group) during the time period of the pilot connections project. The findings of the project may provide a useful framework for discussion of this issue and may suggest
answers to some common questions. This analysis is organized into the categories of administrative, technical, financial, and organizational issues. Each category is discussed in turn, and conclusions or lessons are drawn. The implications of these lessons are addressed at the end of the paper.

**Administrative issues**

From the beginning of the project, it was apparent that hospital administrators were attracted to the idea of the hospital as a node on the “information superhighway.” Some were excited by the prospect of being able to send and receive documents and diagnostic images at high speeds. None appreciated the technical capability required to do this. It was not well understood initially that full service, institution-wide Internet access (a direct connection) was not something purchased from a vendor, who installed it and taught key staff how to use it. Even in small organizations, librarians have been implementing new information technologies using this model for decades. But a direct Internet connection affects an entire organization and requires that the administration be knowledgeable, committed, and supportive. Collaborative relationships among administrators, the information systems staff, and the librarians are essential, because the issues are complex, and any single decision can affect many parts of the organization.

Dial-up access, however, is possible without a strong commitment from senior managers or administrators, and it still opens up a variety of resources not available through the usual value-added networks familiar to librarians. Dial-up access is a logical extension of traditional library resources and services. The librarian merely has to select a provider, learn to budget for the service (as with any new electronic device), learn to use the resource effectively, and train others to use it. In short, it is a new technology for doing what librarians always have done.

Dial-up Internet access is a low-cost, low-risk endeavor suitable for the library or departmental level. On the other hand, a direct connection involves the entire organization and requires high-level knowledge, commitment, and support.

**Technical issues**

The low level of technical expertise available within the community hospital computing environment is probably the biggest barrier to be overcome in implementing a direct Internet connection. When the project began, none of the sites had a staff that knew about the Internet or had any experience with the Unix operating system or the TCP/IP networking software protocols. NorthWestNet was accustomed to working with academic organizations with ample on-site networking expertise and technical support. The service provider's staff was cautious about entering into this joint endeavor, knowing how necessary the on-site expertise was. They agreed to participate with the general understanding that they probably would have to provide more technical support than they would ordinarily and that the RML would provide the required user support, principally in training and applications.

No one fully appreciated how difficult the lack of on-site technical support would be, or how much rethinking and retrofitting of existing network structures would be required. Librarians face a steep learning curve in trying to understand the components of Internet connection and related issues. At every turn, issues of compatibility with one configuration or another grew into difficult questions and created delays. Aggressive technical assistance never was envisioned as being a part of this project, and, yet, it clearly was needed. The Internet service provider was not prepared to offer the requisite support, in keeping with its standard practice and with its understanding of its role in this project.

Hospital system vendors were often of surprisingly little help. One site's primary hardware vendor was openly hostile to the site’s participation in this project and to the idea of connecting to the Internet. Many hospitals have made decisions over time to purchase only turnkey computer systems and applications and to rely exclusively on the vendor for support. They therefore have no systems staff onsite who are capable of assisting with complex networking problems. Another site's networking software developer was sympathetic about the compatibility problems but ultimately not helpful because of the mix of hardware and software in question and the use of untested combinations and first releases of products. Often, no one knew what to do.

All sites faced some early telecommunications problems with the Internet service provider's host computer and occasionally with other Internet services. But the dial-up sites were spared any other technical problems. The four sites were provided with high-speed modems, 14.4 kilobytes per second (kbps) in anticipation of taking advantage of SLIP connections, which would provide virtual access to full Internet services.

The project planners thought the Internet service provider was going to make SLIP service available, possibly on a test basis through this pilot project. But this did not happen, so the dial-up sites were limited to low-speed (2,400 bps) access throughout the project. This has been a disappointment and has hindered the use of the Internet at some of these sites. The reason given for not providing this enhanced dial-up service was that too much technical support would be required by SLIP users. SLIP is more difficult to use than a dedicated line, but many other service
providers are offering this service at relatively modest fees.

The lack of technical resources available locally often led the project librarians and, occasionally, other staff members from the hospital sites to turn to the RML for assistance. The RML staff did not always have the answers, but they were willing to assist and had a helpful perspective. The RML staff, particularly the systems coordinator, often knew where an answer might lie or what direction to take. The project participants valued this assistance. Nonproject librarians and some health professionals in the region also are beginning to consult the RML on Internet connection and use issues.

Occasionally, the Internet itself provided the means for acquiring assistance from experts at other locations. But, as earnest as this help often was, it cannot take the place of on-site or local expertise. Community hospitals attempting to establish a direct Internet connection need the extensive, close involvement of knowledgeable and trained systems engineers.

Financial issues

Cost is a major issue in establishing a direct Internet connection at a community hospital. It is disconcerting to project participants to see the occasional comment from someone ensconced in an academic setting that Internet access is free. It is not.

The low-speed dial-up access provided to all seven sites (enabling them to reach their Internet accounts on the host computer in the Seattle area) was not provided through a toll-free service, but the long-distance charges were covered by project funds. Two sites had access to local Internet hosts, thus avoiding long-distance charges, and one site was in the local Seattle calling area. The four others incurred long-distance charges, and some had average monthly line charges exceeding $250.00. Overall, long-distance charges were seen to be a clear inhibitor of use.

Many other substantial costs are involved in establishing a direct Internet connection. A high-speed (56 kbps) data circuit needs to be installed by the telephone company ($1,500.00). Monthly charges for the data circuit range from $190.00 to $600.00 per month, depending on location—the more remote the site, the more expensive. The Internet service provider charged a one-time fee ($10,000.00) for a connection service package. This service included installing and maintaining the network router, which is a specialized computer to direct traffic between the LAN and the Internet. First-year costs, then, range from $14,000.00 to $19,000.00, including $2,280.00 to $7,200.00 for circuit line charges.

These external networking costs were covered by project funding. Other, internal costs—such as for hardware and software required to bring a network into TCP/IP compliance—had to be met by the hospital.

In addition to the cost for tangibles such as circuits, hardware, and software, there are also annual membership fees levied by the Internet service provider to support the value-added services and other benefits. Institutional fees are based on a combination of the bandwidth used (i.e., the information-carrying capacity of the data circuit) and the expected extent of use of the service, based on the annual operating budget of the institution. Corporate entities and government agencies are charged a standard fee—$15,000.00 for a 56 kbps circuit. Health care organizations receive a 20% discount—$12,000.00. Education and research institutions receive a further 20% discount—$9,000.00.

At the beginning of the project, there was a simpler fee structure based only on institution size, as measured by total number of full-time equivalents on the staff. This was fair enough when all member organizations were in the education and research communities. The project planners argued, however, that this fee structure was not reasonable in this case, because a far smaller segment of a community hospital staff would make use of network resources than would be the case in the typical academic or research setting. Project experience bears out this contention. The team recognizes that this may change in a number of years, when Internet use is more pervasive and there are more clinical applications.

Special pilot project fees were negotiated for the sites. The direct connection sites were assessed $8,000.00 for the first year, which was mostly but, unfortunately, not entirely covered by project funds, and $12,000.00 a year thereafter. The dial-up access sites were assessed a fee of $2,500.00 each for seven online accounts (one for the project librarian and six others to be assigned to key staff at the librarian’s discretion). As noted earlier, this dial-up access was neither toll-free nor high-speed. NorthWestNet did not intend to offer dial-up access as a standard service and membership option. The provider’s approach emphasizes value-added services that are attractive to academic institutions that are widely networked and can take full-scale advantage of the economic value of these services. This value is effectively lost through limited dial-up access.

Cost is always a major issue in health care and is becoming more so. Costs are highly visible to administrators, especially when they apply to a new technology, and even more so when the need for that technology is not well understood. Internet service providers have to realize that the community hospital market will require a different strategy and fee structure than those used for academic and research institutions. With affordable, entry-level opportunities (e.g., a low-cost SLIP connection over a LAN), com-
Community hospitals can build a base of support for a full-service, direct Internet connection.

Thus, while community hospitals are potentially a large market, Internet service providers will have to develop new approaches to exploit it. It is probably not economically feasible for a provider to offer the intensive but affordable service this market requires, at least for the foreseeable future. However, many factors—economic and regulatory, to name two possibilities—could alter this situation quickly in the next few years.

Organizational issues
Hospital librarians have played the central role in introducing the Internet to these clinical settings. This is a logical extension of the librarian's role as the resident expert in managing external information resources. There is no controversy in this role extension as long as it does not raise potentially difficult questions about the hospital's information systems strategy, structure, and accountability.

Dial-up Internet access does not raise these questions. Hence, the organizational risk is low. But attempting to establish a direct Internet connection often does raise these questions. Although the librarian often may be viewed as a neutral (or merely non-threatening) member of hospital management, this questioning of hospital computer networking can be seen as threatening by the information systems staff. The perceived threat and a defensive response may lead to a territorial stand-off.

One of the sites has had a particularly difficult and protracted turf battle over the question of Internet access. In this case, the information systems staff did not think the librarian had any business making recommendations about the direction the hospital's computer networking structure should take. This situation has led to a good deal of professional distrust on both sides of the argument and to delays. This problem surely will be faced by other hospitals.

The Joint Commission on Accreditation of Healthcare Organizations' newly revised standards for information management implicitly call for information systems staff, medical records staff, and hospital librarians to work together—to collaborate in the information management of the hospital. The librarian's potential contribution to the hospital's response to these performance-based standards may lead to eventual enlightenment concerning the value of networked information in the community hospital setting. The standards may be used as an argument for resolving or at least ameliorating potential turf battles.

Turf battles notwithstanding, each group in a hospital has concerns that are legitimately distinct, but these cannot be considered in complete isolation from each other. The clinical staff is focused on inpatient care. The information systems staff is focused on keeping the hospital's systems running. The medical records staff is focused on patient information and billing procedures. Librarians rightly are focused on the environment and on external information resources—beyond the hospital walls—in order to fulfill the information needs of clinicians and administrators alike.

These distinct professional outlooks may contribute to the development of an overall view of information management that will serve the needs of the organization. Just as many academic medical centers have developed Integrated Advanced Information Management System (IAIMS) models, so too must community hospitals develop an integrated approach to information management. It could be a serious disservice to the community if the promise of Internet connectivity were held hostage in fruitless battles over departmental control.

CONCLUSION
The pilot connections project demonstrates that it is an unusual community hospital that is ready, willing, and able to establish a direct Internet connection. The project also shows that the clinical utility of the Internet is not yet readily apparent in a typical community hospital. This situation is beginning to change and likely will do so with increasing rapidity. When a critical mass of easy-to-use, relevant resources with obvious value to health care providers is available, community hospitals will have a much clearer incentive to invest in this technology. Other external factors, such as health care reform and reimbursement issues, could heighten the potential productivity gains from Internet use and further add to the incentive.

Establishing a direct Internet connection at a community hospital is a major undertaking, requiring institutionwide planning and commitment. The required elements of this planning and some of the pitfalls that may be encountered have been described. The desire to use the latest technology to move large data files or transfer diagnostic images may be necessary but is not sufficient in itself to ensure success. There also needs to be an understanding and assessment of user needs, a comprehensive approach toward information management, and an understanding of how information resources and communication services through the Internet will contribute to the mission of the community hospital.

The typical community hospital is not there yet and will need several years of hard work to get there. But this is clearly the direction in which health care needs to be moving. High-quality, cost-effective health care will not be possible without integrated information management and the access to information that the
Internet makes possible. The project team thinks forces from many different directions will begin to accelerate the transformation: as Internet-experienced health professionals enter into practice, they will bring demand for access to their workplace; and the Health Care Financing Administration’s electronic filing requirements surely will affect the computer networking decisions of community hospitals [2]. Add to this a mixture of innovative cable television companies, telephone companies, and other computing and communications interests, and one can only guess at what changes will take place and how quickly.

One of the lessons of this project is that health care in the community setting must come to grips with the role of information in the provision of care. Another lesson is that the Internet is not yet a clinically useful tool. A question that is raised by this project—and also by the health care sector’s relative lack of substantive presence in national computer networking activities—is whether the interests of health care can be advanced effectively by the academic and research communities from which the Internet has sprung and that manage the networking infrastructure. Would health care be served better by a networking consortium dedicated to health care as a vertical market? This question bears further consideration.

At no other time has the library profession faced such an opportunity as it does now. The satellite broadcast of the 1994 MEDLARS update included video clips of National Library of Medicine Director Donald A. B. Lindberg and Vice President Al Gore stating that librarians are in positions to play major roles in the ongoing development of a national information infrastructure [3]. Steve Cisler of the Apple Library described the opportunity: “Librarians have many roles to play as users, facilitators, guides, consumers, and information providers...no other group has the potential for feeling at home in this electronic place than we do” [4].

There is a continuing need to connect community hospitals to the developing resources of the Internet. Librarians must develop their skills as advocates for information management and work to overcome the obstacles outlined in this paper.

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RESOURCES

The pilot project librarians found the following resources to be particularly helpful in learning the language, concepts, and issues of Internet connections and resources:


REFERENCES


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