Special Article

The Internet and the Future of Psychiatry

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Objective: The Internet is a rapidly growing communications resource that is beginning to have an impact on medicine, and it is anticipated that the Internet will soon have a major effect on psychiatry. It is essential for psychiatrists to have a conceptual framework for understanding the many aspects of the Internet. _Method:_ Using a four-layer model, the authors describe the components of the Internet and how these work together to establish communication. They discuss some of the practical implications of the model, potential future applications of the Internet, and some of the challenges its use will create. _Results:_ In the Internet model described, the bottom three layers involve hardware and modes of information transmission; the fourth layer is human interaction. The Internet has great potential in psychiatric education, clinical care, research, and administration, but major adjustments in individual and organizational expectations and responses will be needed. These changes relate to the speed, dispersion, volume, privacy, and permanence of communication. _Conclusions:_ The growth of the Internet and related information technologies is inevitable and has diverse technical and social implications. As psychiatrists, we must remain effective communicators of information and adjust to a changing world with new roles and skills that will permit us to best serve our professional mission.
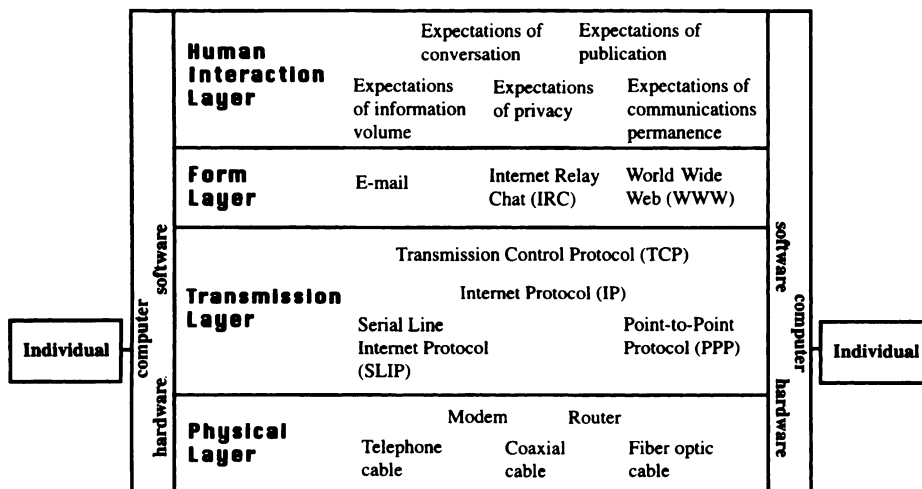
(Am J Psychiatry 1996; 153:861–869)

With the approach of the twenty-first century, we are now witness to major changes in technology and the impact these changes are having on our culture and work. Of these changes, one of the most important is that occurring in information technology, brought about by advances in computers and networking. We are now able to communicate faster, to more places, and in more ways than ever before. These potentials, however, bring with them unanticipated difficulties as the speed and dispersion of information increase. Physicians are now faced with an overwhelming set of new information demands and information sources. Computerized patient records, third-party payer databases, and diagnostic instruments based on artificial intelligence are just a few examples. Any individual facing such a deluge will fail in an attempt to navigate this future without a framework for incorporating and organizing these informational challenges.

The Internet is one particular example of such an information challenge. This network of computers serves as a tool for instantly communicating complex information among millions of people all over the world. Its impact is reflected in its frequent discussion in the popular press (1) and recent articles in medical journals, such as _JAMA_ (2), the _Journal of Nuclear Medicine_ (3), the _Journal of the American Academy of Dermatology_ (4), and _Academic Medicine_ (5). It is being used to distribute information about city traffic conditions, stock market status, news, and government legislation. Over the last year, over 20,000 businesses started marketing products through the Internet (6), and they now account for $50–200 million in commerce. Transactions are expected to rise to $2.5 billion by 1998 (7). The Internet is becoming a part of everyday life around the globe, and this presence is extending into medicine as well. Radiologists are using the Internet for providing interactive teaching experiences and for continuing medical education (CME) credits (8–11). Researchers are establishing shared databases of information (12–16). Some clinicians are examining and billing patients by using videoconferencing technology routed through the Internet (17).

Such applications are now being extended into the

FIGURE 1. Four-Layer Model of Internet Communication

Human Interaction Layer	Expectations of conversation	Expectations of publication		
	Expectations of information volume	Expectations of privacy	Expectations of communications permanence	
Form Layer	E-mail	Internet Relay Chat (IRC)	World Wide Web (WWW)	
Transmission Layer	Transmission Control Protocol (TCP)			
	Internet Protocol (IP)			
	Serial Line Internet Protocol (SLIP)		Point-to-Point Protocol (PPP)	
Physical Layer	Modem	Router		
	Telephone cable	Coaxial cable	Fiber optic cable	

(Individual → computer software / computer hardware ← → Individual; software / hardware labels on sides)

field of psychiatry. APA is currently investing $1.2 million to update its own capabilities (18). As these networking technologies begin to play a role in our practice, it is essential for all psychiatrists to have a conceptual framework for understanding the many aspects of the Internet. This paper provides such a framework, using a four-layered model of Internet-based communication. After presenting this model, we will discuss some of the practical implications of the model in terms of using the Internet and potential future applications of the Internet. We will end with a description of some of the challenges that the use of this technology will create.

MODEL OF THE INTERNET

Understanding the Internet is difficult because it is complex, with a layered structure that must be grasped in its entirety in order to be effectively used. To simplify understanding of the Internet, we have designed a simple four-layer model (figure 1). In this model, each layer represents a type of protocol or agreement that different Internet users must share if they wish to join this computer network and communicate. The lowest layer is the physical layer. This is the set of agreements about physical wires and wiring standards that allow computers to connect with each other (19). The next higher layer is the transmission layer, which includes all protocols for how to pass information from one point on the network to another. This includes Internet Protocol (IP), which defines for each computer where other computers on the network are located so that transmissions are not lost (20, 21). The layer above that is the form layer, which specifies what medium and organization the actual transmitted information should use. Many forms of communication are used on the Internet, from text-based E-mail (22), to videoconferencing (23), to the World Wide Web (24,

25) (table 1). The final layer is the human interaction layer, where the protocols represent the interpersonal expectations that people implicitly form when communicating with each other.

This final layer has the most relevance to psychiatrists using the Internet and will be discussed more fully. The three previous layers have more technical natures, which make their details constantly change with advancing technology. A complete understanding of these layers is not essential for the average psychiatrist, but as they provide a foundation for the fourth layer, we shall first use a simple example to give a general overview of how these layers work.

Technical Layers

If someone with a computer wanted to communicate through the Internet, the first step would be to form a physical connection (first layer). The person could accomplish this by purchasing a modem and using it to call an Internet service provider (26). The Internet service provider would route the signals from the telephone call into the larger Internet. Many transmission protocols (second layer) would be important to make this physical connection useful. Appropriate software would make the computer modem speak the same language as the Internet service provider's routing computers. Such software is usually provided by the Internet service provider. As mentioned before, there are also Internet protocols that the user's computer must also speak. Software that permits this type of communication (Transmission Control Protocol/Internet Protocol—TCP/IP) usually is supplied with the computer and the computer operating system.

Once Internet communications are established in the first two layers, the user must choose a particular form of communication (third layer). If the user wanted to use the World Wide Web, he or she would need to obtain Web-browsing software for the computer. Completing these three layers allows information to be exchanged. It is important to note that each layer is built on the preceding layers and is therefore limited by them. A lower-speed (e.g., 1200-baud) modem can support transfer of E-mail, but it is too slow for transmitting the large images of the World Wide Web. Such limitations become irrelevant with production of newer devices that simplify technology for the end user. In the future, a user of the Web might not use a computer at all but, rather, a box that connects to the user's television set (27). The processes of the technical layers would still

TABLE 1. Form Protocols Commonly Used on the Internet

Name	Description	Examples
Electronic mail (E-mail)	This protocol provides an electronic mailing address for each user. Each user can then send a typed text message to any other user whose address the user knows. The software that implements this protocol often allows the user to easily send multiple copies of a letter or create a reply to a letter that includes a copy of the original message.	Author's address: mhuang@umich.edu Goldberg psychopharmacology discussion group: pycho-pharm@PsyCom.net *Psycoloquy* subscription: listserv@pucc.princeton.edu
File transfer protocol (FTP)	This protocol uses a client/server model by which a user (client) can connect to a document-serving (file-serving) computer, obtain a list of the different files available, then either copy one of these files from the server to the user's own computer or load a file onto the server.	*Psycoloquy* back issues: ftp://ftp.princeton.edu/pub/harnad/ Indiana University software site: ftp://ftp.iupui.edu/pub
Usenet news (also net-news)	This protocol defines "newsgroups," each with a particular topic. A user signs on to a particular group and receives copies of all the latest messages posted to the group. The user can read messages or send messages back to the group.	*Psycoloquy* back issues: news:sci.psychology.journals.psycoloquy Alzheimer's disease research discussion group: news:bionet.neuroscience.amyloid
Telnet	This protocol uses a client/server model by which users (clients) connect to a serving computer, simulating a local terminal. This enables users at a distance to perform all the same functions local terminal users can perform.	Food and Drug Administration: telnet://fdabbs.fda.gov Medline: telnet://um-medline.bih.harvard.edu
Gopher	This protocol uses a client/server model that organizes information on different computers in menus that can be linked together. Information requests are made by simply choosing an appropriate menu selection.	National Institutes of Health guide to grants and contracts: gopher://gopher.nih.gov:70/11/res/nih-guide National Library of Medicine: gopher://gopher.nlm.nih.gov National Institute of Mental Health: gopher://gopher.nimh.nih.gov:70/1
Internet relay chat (IRC)	This protocol defines "channels," specifying a topic of conversation for each channel. A client may obtain a list of ongoing topics of conversation and join those of interest. All clients connected to a particular channel type messages onto their screens. These messages are immediately sent to everyone else on the channel, so others can respond in real time.	InterPsych's "Staff Lounge": channel #interpsyc
Wide area information servers (WAIS)	This protocol uses a client/server model in which the client computer connects to the server and allows the user to submit an inquiry in plain English ("Tell me about the use of risperidone in schizophrenia"). The server takes the inquiry and searches specific databases for relevant articles, ranking its results in the order of relevance and sending the list back to the client.	Directory of servers
World Wide Web (WWW, W3, the Web)	This protocol uses a client/server model in which a server document containing words and graphics is displayed on the client's screen. These documents can contain hypertext links. A link specifies other documents on the same or another computer that the client or browser will immediately jump to if the client wants further information about the linked text or pictures.	Psychiatry Star: http://www.psych.med.umich.edu *Psycoloquy*: http://www.princeton.edu/~harnad/psyc.html Genome Project database: http://gdbwww.gdb.org/ American Academy of Child and Adolescent Psychiatry: http://www.psych.med.umich.edu/web/aacap/ University of Iowa Virtual Hospital: http://indy.radiology.uiowa.edu/VirtualHospital.html

occur but would be invisible to the average user. What will remain important are the factors describing how people use the Internet as a communication device.

Human Interaction Layer

The previous three layers represent the technical requirements for achieving Internet communication. There is an important additional layer of human interaction that is built on these previous layers when the Internet is used to produce communication between

people. Our "protocols" for communication between people are derived from centuries of experience with oral communication. In a conversation, we are accustomed to speaking to another person in a situation where that person can immediately hear our words and we can monitor his or her nonverbal responses. The use of technology affects these expectations. The technology of writing created "written conversation," which lacks the immediacy and monitoring aspects of its oral precursor. Readers of works by an author need certain levels of trust, expecting that written exposition will ac-

curately reflect the other person's views (28). In a similar fashion, correspondence through the Internet does not conform to our usual expectations of oral or written correspondence. The most difficult task for someone learning about the Internet is not mastery of the technical layers of communication but acclimatizing oneself to the shift in expectations that is generated by a new format for communicating.

There are many shifts in expectations that people must face in using the Internet. One of the first is the speed of communication. Messages sent through the Internet can travel around the world almost instantly. In fact, E-mail users refer to traditional mail as "snail mail." In using this designation, they set the communication experience apart, revealing a perception of its difference from the usual experience. This difference increases as the speed of communication brings about increases in the speed at which information spreads. More familiar media for communication do not allow information to move immediately from one person to several thousand people with a simple keystroke. Because it is easy for people to circulate information quickly to a large audience, it also becomes more difficult to maintain the same expectations of privacy. People using the Internet need to realize that their communications will be distributed to many areas that are not obvious from the context of the immediate communication. Psychiatrists who are accustomed to discussing clinical cases with colleagues generally expect that the information will not be widely disseminated. An E-mail conversation that "feels" as though one is conversing with only one or two individuals could actually be sent to thousands. Even when one knows he or she is E-mailing to a few individuals, the ease of duplicating messages and forwarding them to other colleagues will inevitably enlarge the circle of communication to a far greater extent than one expects.

Related to the expectation of privacy in communication is the expectation of impermanence. Oral communication and even written communication, before the advent of easy-to-use copying machines, were often expected to be impermanent. They lasted only as long as the memory of the audiences or the pieces of paper on which they were inscribed. Since Internet communications all travel through multiple layers of software and hardware, it is easy to monitor or even digitally record communications. This ability to record and document all communications creates an altered expectation about communications through the Internet. Internet users should keep in mind that their employers, the government, and legal agencies may be interested in examining their communications and that use of the Internet permits this. Various legal precedents suggest that such groups have rights to monitor these communications because they are different from their nonelectronic counterparts (29–31). Thus, the managed care psychiatrist who uses E-mail for communication might have the content of his or her messages recorded by the employer for the purpose of monitoring efficiency, regardless of privacy concerns.

The increased speed and dispersion of communications also increase the volume of information to which the individual is exposed. Traditional oral and written communications often limit people to more familiar realms for obtaining information, so that they always return to the same journals or colleagues that are available in a particular physical location. Access to a worldwide network exposes individuals to a large set of electronic publications and intellectual colleagues that one could not expect with traditional communication (32). The Internet user must not only expect increases in information and information sources but must also form strategies for determining the value of information so that his or her energy can be focused appropriately. Just as a psychiatrist today must filter dozens of journal articles to distill relevant information, the Internet user must filter thousands of electronic journals and messages, and this process can be overwhelming.

A final element that has a pervasive effect on people using information technologies is the continuous expectation of change. Newer, faster computer and networking hardware appears every month. New software and communications protocols emerge to take advantage of these changes. Information providers change their information to take advantage of the new technology, so that the information seen by each user of the Internet changes as high-speed links appear or graphical and audio protocols replace older, textual ones. In this environment, Internet users need to change their expectations about the communication of information. Unlike familiar paper publications, information in electronic form will continue to shift in content, appearance, and the technology required to access it. A psychiatrist who has become accustomed to receiving patient education pamphlets from a gopher-type information server might suddenly find this resource disappear as the information migrates to servers based on the World Wide Web. He or she would have to learn to use a new set of software and perhaps hardware to access information. Those familiar with using the Internet already anticipate they will need to continue learning new technical details and finding new information sources. The expectation of fluidity, like expectations about the speed, permanence, and volume of communication, is another factor in everyday communications that can no longer be taken for granted in the context of the Internet.

FUTURE APPLICATIONS

Despite the difficulties that connecting to the Internet poses in both technical and psychological realms, we are driven to apply these technologies in our work because of the potential they represent. In the areas of education, clinical care, research, and administration, there are many ways that the Internet will be used, with major consequences in building the future of psychiatry.

Education

Education in psychiatry will change as the Internet improves communication and provides access to informa-

tion for patients and psychiatric trainees and for physicians pursuing continuing education (33, 34). Internet use will continue to expand, and the general public will use it as a resource to obtain information about psychiatric illnesses. They can already read electronic articles about bipolar disorder and schizophrenia or join electronic support groups, self-help groups, and discussion groups (35). They will continue to seek easily accessible information, and to meet growing demands, Internet-based information resources will develop from academic, government, and other institutions with educational missions. As the Internet begins to increase the public's expectation of information and the demand for psychiatric information, commercial providers will also enter this arena. Managed care organizations are already investigating means for reducing cost through computer-based medical education (36), and such forces will further encourage the development of networked information resources. Self-score scales or descriptions of warning signs coupled with information about how to obtain help can be posted on the Internet and made easily available. Psychiatrists should be involved in making such information available, acting as experts in teaching the public about recognizing and appropriately reacting to mental illness. We will clearly feel an impact if managed care companies independently develop Internet-accessible computerized screening tools that refer patients to care providers without our input.

In addition to serving patients, educational materials will be developed for training psychiatrists and providing continuing education. There are already sites on the World Wide Web that teach radiological diagnosis (9–11) or provide teaching cases for which the trainee asks for information on examinations and on past, medical, family, and social histories and then must come up with a differential diagnosis (37). CME credits are available for some of these training programs, and their presence on the Internet makes them available to anyone in any country or rural location as long as the user has a computer connection. Psychiatrists should be involved in producing such educational resources to ensure that the recognition and treatment of psychiatric illnesses are well taught to psychiatrists and to primary care practitioners. The importance of this rises beyond simple instruction. Care-providing organizations seek to monitor and create standards of training, licensing, and care. The Internet's ability to widely distribute uniform, sophisticated multimedia training tools will be used by these organizations to document and verify the education of psychiatric practitioners. Thus, Internet-based instructional materials might eventually become related to the establishment of practice standards. While making us better educated about psychiatry, Internet materials might also make our practice more uniform, creating legal risks for those who are unaware of newly promulgated information or standards of care.

Clinical Care

Just as educational information will have greater dissemination through the Internet, so will clinical informa-

tion and information about clinical treatment. Electronic patient records have been pursued as a means for improving the continuity and efficiency of patient care (38). The presence of the Internet will encourage the use of communications networks for transmitting that information. Much of this is likely to be driven by third-party payers or treatment review organizations that will want to receive copies of patient information from clinical sites (39, 40). Treatment providers in emergency and rural settings will also want more broadly accessible patient information, so it can be made available in any treatment location (41). Psychiatrists should be involved in the creation and use of these Internet-based information systems to ensure that they include adequate descriptions of psychiatric observations and other psychological data.

The increasing availability to clinicians of medical and psychiatric data will be paralleled by an increase in the clinical information available to patients. Health care consumers who are accustomed to accessible educational information on the Internet will also expect easy access to treatment and consultation from physicians. They will expect to be able to reach mental health providers through their electronic information gateways, and these interfaces will likely evolve from the current text-based inquiries to more sophisticated video-based consultations in which patients talk to their physicians through computers. Such "telemedicine" psychiatric interviews are already being conducted regularly in at least 11 states (17). The Internet will work to change our practice, emphasizing our role as teachers and information providers and encouraging the use of electronic interfaces with patients.

Research

As the Internet becomes more involved in information transmission in education and clinical care, health services research will benefit greatly. The transmission of clinical information for treatment is a short step from the transmission of clinical information into databases. Psychiatric information is already gathered by clinician networks, such as the APA clinician network (42). This network of clinicians reports clinical information through modems to a central data repository. Use of the Internet would allow more uniform access on a global scale. Tracking practice patterns on such a large scale will help us execute outcomes research to elucidate which treatments are effective and which are not.

As the Internet begins to provide psychiatrists with improved opportunities for collaborative research with psychiatric colleagues, it will also expand our communication with neurologists, internists, psychologists, and other specialists. This improved information exchange will extend the boundaries of our research and make our learning more accessible to other specialists. Projects such as the Human Brain Project will bring together more of the data necessary to form an integrated model of brain function, incorporating development, genetics, behavior, brain physiology, and demographic and social information (43–45). The future of research will be "collaboratories" (col-

laborative laboratories) where co-workers from multiple specialties are connected electronically instead of joined in a physical location (46). They will be able to conduct experiments and study databases through shared computer-based models. These "research centers without walls" are cost-effective in their efficient use of national and worldwide resources (47). Psychiatric researchers will find that the Internet will bring them into contact with more colleagues both inside and outside the specialty, generating new questions and new directions for research.

Administration

The growth in information exchange that the Internet is creating will also create changes in organizational structures. All organizations have a representation that they present to others, and this representation provides identity and definition. Corporations, institutions, and governments all use these representations as points of communication with others. With the Internet, these representations are becoming electronic. Currently, the most rapid way to obtain information about presidential press releases is through the Internet (48). More organizations will also assume electronic representations in order to more efficiently communicate with the government and the public. APA is creating a presence on the World Wide Web (unpublished report on the APA electronic communications project to the American Association of Directors of Psychiatry Residency Training, January 1996). It plans to use this Web site to reach the general public, increasing patient awareness and education, providing general information on treatment and diagnosis, and providing referral sources to patients. APA also plans to use its site to unify its own organization, providing information on dues and other membership business, distributing newsletter and meeting information, and surveying the membership for both research and governance data.

As institutions become more electronic and less "physical," they will also become more decentralized. Physical locations will mean less as people organize themselves according to electronic representations of institutions and use distanced communications. Academic departments of psychiatry or psychiatric treatment groups will be defined by their communications and desire to be aligned, rather than by physical location. Electronically based organizations already exist and will become more prevalent with advances in technology (49). Such changes will require adjustments in how we operate organizations. It will be more difficult to create centralized plans as members become more diverse and distributed. We will need to create governing structures that can represent such multiple interests and demands, while still keeping organizations responsive to the accelerated pace of change.

FUTURE CHALLENGES

The rapidly moving future just described brings with it several specific challenges that are directly derived from the freedom and ease of information exchange that the Internet delivers. We divide these problems into three major areas: the need for organization, the need for standards, and the need for security and privacy. These problems represent a general challenge for both individuals and organizations as the Internet alters our future communication.

Need for Organization

The highly varied protocol structure of the Internet creates opportunities for disorganization. Information travels through particular paths, which may not intersect. What is known on the E-mail network does not necessarily travel to the gopher or World Wide Web networks, and vice versa. What an administrator expects about permanence of E-mail communication might not coincide with the expectation of a staff clinician. Furthermore, the continuing growth of technology creates constant change as new techniques are applied to each layer of protocols. Changes in wiring in the physical layer or introduction of new video application protocols in the form layer will reverberate through all layers, requiring adaptation. Such changes are made even more complex by a lack of centralized governance. Although protocols are designed and approved by the Internet Engineering Task Force and the Internet Society, these volunteer organizations avoid global planning, relying on the creation of work groups to devise solutions to technology problems as they arise (50). This system has worked well thus far, but it creates a patchwork environment that requires time to learn. The Internet's complexity and continually shifting nature will isolate users and information providers who are not knowledgeable about such intricacies or cannot spend the time to keep up.

This constantly changing environment represents a challenge to all individuals and organizations using the Internet. Time and resources need to be allocated to studying each layer of communication. Individuals are faced with gaining familiarity with computer hardware in the physical layer, Internet connectivity in the transmission layer, software applications in the form layer, and the potential difficulties in adapting communication expectations in the human interaction layer (51). For large organizations, this task becomes more complex as they attempt to create experts at each level of communication who can master the various changes in their areas of Internet study (52). These experts must be able to communicate well with each other, as any change that affects one of them will spread to affect them all. Not only will psychiatric organizations need to invest in the technology and personnel to remain part of this fast-moving world, but they also will have to develop new internal organizational structures so that new equipment and personnel can interact with all parts of their establishments in ways that promote effective use of and education in these technologies. Large health care organizations and managed care organizations are already adopting these new modalities of op-

eration (53, 54). Psychiatrists who are part of such organizations will find it essential to demand that they be educated and included in the introduction of these changes, or else they will fall from the network of communications and decision making.

Need for Standards

The difficulties reflected in the need for organization of the Internet are compounded by a need for content standards. Although protocols provide some standards in creating the framework for communication, they do not make specifications for the content of that communication. The ease of communications provided by the Internet allows anyone to put out information of any sort. In the electronic world, there is often no verification of validity, no process of review or quality control. Paper journals, on the other hand, have built longstanding reputations for the type of information they contain and the quality with which that information is organized and presented. A policy statement by the editors of the New England Journal of Medicine limits electronic circulation of manuscripts and describes the editors' concerns about the maintenance of familiar standards (55). Some electronic journals are now peer reviewed (56, 57), but the main body of reviewers and editors of psychiatric journals publish solely in the paper realm. The sheer volume and speed of electronic publication will call for a different review process for much electronic information (58).

This difficulty in establishing and judging value presents a challenge to individuals and organizations using the Internet. Individuals will need to exercise discrimination in judging their Internet communications. The fact that an electronic journal or letter "feels" like a paper one does not automatically lend validity to its contents. Conversely, organizations that serve as information providers must allocate effort to translating techniques of validation and critique from paper to the electronic realm. They will need to monitor their electronic works to maintain quality and direction without falling prey to the trap of publishing electronic words simply because it is easy to do so. If we as psychiatrists wish to publish and exchange information in this growing electronic world, we will have to commit ourselves to creating editorial boards and standards organizations that work to continually monitor this new river of communication.

Need for Security

A third challenge of the Internet is to address the need for security and privacy that the free exchange of information places at risk (59, 60). In psychiatry, this becomes an extremely important issue, as we must protect the confidentiality of patient information. Breaches of security can occur at all levels of communication. At the physical and transmission layers, the information packets that are sent are susceptible to interception at different points in their journey. Some form protocols have features that do not match human expectations based on direct communications between human beings. The person talking to someone else in a videoconference does not automatically anticipate that others will record such a session, although this capability is easily available to all conference members. Someone mailing a private electronic letter may not expect its contents to be excerpted and forwarded to others. Such occurrences become more common as the Internet makes information transfer easier and consequently less private.

The challenge posed by the need for security will require individuals and organizations to learn and prepare for such potential breaches of privacy. At the technical layers, such problems are being addressed with the use of encryption and the creation of "firewalls" in the network. The human layer, however, is the hardest to regulate. "Hackers" who attempt to break security systems invariably do so by approaching the network through people, duping them into giving out their passwords. They might present themselves as system maintainers, impressing the unwary with technical jargon and asking for computer access. Other hacker techniques include "dumpster diving"—looking through trash cans for paper memos and notes containing the scribbled passwords that computer users write to themselves to help remember how to access their systems. People will always be the most likely contributor to a security risk, and the small mistakes of an accidental breach of confidentiality will be compounded as the Internet makes it easy to communicate globally from any desktop. Internet users will need to understand all the different ways in which they can compromise private information, and organizations that provide Internet access will need to make sure their employees are educated about these possibilities (61).

THE FUTURE

Although it is unclear how psychiatry will face the future challenges just discussed, we can anticipate how others will react to the potential of the Internet. The Internet itself evolved with government sponsorship, first from the military, then later from the National Science Foundation, which made it more academic (62–64). This network was sold to commercial bidders in April 1995 (65), paving the way for more profit-driven control of information flow (66). Eventually, people will have to pay for information they send through the Internet, assessing the value of information in concrete dollars and cents. Business organizations will be the first to tackle these Internet challenges, seeing them as an opportunity for positioning themselves in the future (6). As these interests redefine the value of information, a new "information economy" will slowly evolve (67). We are already seeing some of the early effects of this in our profession, as the tasks of caring for patients become more simplified and automated and as psychiatrists are used more as information resources—supervising and teaching others.

CONCLUSIONS

The Internet is more than a physical network or set of protocols. It is a communications phenomenon by which more and more people will have the ability to transmit more and more information quickly and easily on a global scale. This capability is affecting us at a societal level as people begin to expect and demand instant information. In psychiatry, we will be faced with calls from researchers who want clinical data; educators who want clinical experience; third-party payers; government regulators; and patients who want documentation of clinical expertise. We will be expected to be able to use information management tools such as the Internet to meet these demands. Although we may refuse to meet all of the demands put to us, we will not be able to avoid the fact that this movement will continue to sweep the rest of society along.

With such forces as a background, we need to formulate a cogent understanding of the Internet's function so that we can establish a direction and goal for moderating change. Whether that goal is to limit breaches of confidentiality, improve patient communications, or contact a worldwide audience, change will occur only if all the different levels of the Internet communication model are addressed. Implementation of physical wires or communications software will fail without organization of expectations for communication by people. Studying how information flows through an Internet network also requires studying how information flows among the people who wish to send it—knowing the priorities, goals, and impact of different kinds of information on the human network.

As psychiatrists, we will be required to negotiate between the informational demands that will be required of all medical practitioners and the central goals that drive us in our profession. As a profession, we should be aware of and encourage the study of how information is used in psychiatry. We must continue to educate ourselves so that we can remain effective organizers and communicators of information. We must adjust our expectations of ourselves and others and be constantly prepared to adjust to a changing world with new roles and skills that will permit us to best serve our ongoing professional mission.

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