Changes are occurring in health care professionals’
and patients’ roles, health care practice, and the
organization of health care delivery.1 As the use of
information technologies in health care explodes and
consumer involvement increases, medical and health
informaticians face new challenges. More and more,
people are using information and communication
technology to obtain health information.2,3 With an
entire new field of consumer health informatics
developing, informaticians have the opportunity
to play an important role in supporting the new part-
nership between providers, consumers/patients,*
and information technology.
for medical informatics; specifically, the nature of health information, patient participation and shared decision making, clinician responses, and Web technology. This panel was followed by a session of audience discussion and questions.

The track then continued with two panels in which commentators responded to and expanded on the ideas presented in the opening session, raised additional important concerns, and provided provocative commentary. Each of these sessions was divided between panelists’ remarks and audience participation. The first commentator panel reflected perspectives of developers of successful consumer health applications (Dowling, Friedman, and Houston). The second commentator panel comprised experts in patient empowerment and Web site design (Frydman), philosophy and bioethics (Goodman), and economics and regulation (Temin).

Next, more than 50 people participated in a discussion and breakout sessions. After the entire group identified key research themes, directions for future activities, and policy needs, participants met in smaller groups to address the main issues that were raised. These groups recommended activities and identified issues, which were presented at the plenary session that closed the entire Congress.

What follows is a report based on panelists’ remarks, audience discussion, and the breakout sessions. Analyses, opinions, and recommendations reflect the overall sense of the track, rather than the views of the author or any single participant.

Themes

Several key themes emerged at the Congress:

- Changes in roles of consumers and providers
- Support for a patient–provider–information technology partnership
- Virtual, not physical, structure for health care and health care information delivery
- Health care as an integrated part of each person’s life

These themes reflect trends that are intertwined, as suggested in the following discussion.

Consumer health information both fuels and is fueled by changes in the roles of patients and providers. Patients are becoming increasingly empowered, and they expect more personal attention. Health care is no longer “contained” in an office or building but includes activities at home, at work, in the gym, and at the food store as well. Moreover, as the institutional walls surrounding health care delivery are breaking down, health care is being delivered in virtual space, so that a person can obtain information, and even health care itself, from a variety of places that are distant from each other and from the person. These changes are leading to redefinitions of “health care,” “patient,” “provider,” and “practice.” The boundaries of the health care delivery system are permeable and in flux, as geography and physicality are becoming less relevant to health care and health encounters.

At the same time, cost pressures are increasing for providers, patients, and payers. Patients, as the largest unused resource in health care, represent a partial solution to these pressures while also being an avenue for improving health care services. As pressures to control health care costs increase, care is shifting closer to the home, and decision making is involving the patient more than it did in the recent past.

Computers can be used to empower and enlighten patients and help forge a new partnership between patients and providers. To accomplish this, patients must take an active role in their own health care. In many cases, they already manage aspects of their health care. Diabetics administer their own insulin, families keep birth and death records, parents keep track of when immunizations are due, and many people engage in exercise, diet, and other self-help activities. They make such important decisions as when to see a practitioner and whom to see. The capacity for partnership is already evident among patients and providers, and it is likely that with appropriate and targeted consumer health informatics tools, this partnership can be actualized further.

Trends

As clinicians and patients negotiate their expectations of each other and coordinate their roles, they need parallel services that provide just-in-time information for making health-related decisions.

Several major trends are evident in what consumers want and how it is being provided. First, consumers want personalized relationships with their clinicians, more than with a hospital, so that they get information that addresses their individual concerns and conditions. Second, consumers also want interactive tools to manage their health and diseases. For example, in the CHESS project, patients can use a decision aide to determine the treatment choice most consistent with their personal values. Some of these inter-
active tools are being provided by disease management companies and health plans. Similar techniques are being used for health promotion as well (see, for example, Houston et al.9).

A third development is the growth of wireless technology, making it possible for people to monitor their diseases in much the same way that physicians do. The Telephone-Linked Care system,10 which has been used in this way to monitor patients with chronic diseases like hypertension, is one example.

Fourth, we are seeing the decline of megaportals that provide information on a wide range of topics, from health to entertainment, and the rise of vertical portals that integrate information around a single theme, such as the prevention and treatment of cancer. These are being developed by for-profit companies and by companies in partnership with academic medical centers. In short, people want the same services in health care that they now can get via the Internet from the financial services industry. They want, and benefit from, highly personalized, customized, targeted, tailored information and, ultimately, care delivery and case management.11

Until recently, many health care organizations were reluctant to invest in Web sites. No longer is health information controlled by health care professionals, and no longer is information technology developed solely by medical or health care informaticians. Health information Web sites are being developed by hospitals, e-health ventures, managed care plans, and pharmaceutical companies. However, lack of systematic development efforts, lack of an organizational culture that promotes the use of the Web and Internet services, and lack of clear business plans have resulted in poor interfaces and limited tools on Web sites developed by some health care organizations. Consumers and patients also are developing Web sites, listservs, newsgroups, and other means to communicate among themselves and form online communities.12,13

Acceptance of general-purpose tools for clinical use is also growing. Providers and patients are seeking new ways to enhance communication.14 E-mail is being used by patients and clinicians to communicate with each other.15–17 In addition, new special-purpose devices, such as in-home monitoring systems, and new uses of common devices, such as telephone data entry, are improving communication between patients and providers and thus improving health management.18

The explosion of sites and services is giving rise to public and governmental concern over the quality of information, privacy issues, legitimacy, and changes in practice. At the present time, self-regulation activities are vigilantly undertaken by some consumer Web sites, with the online community demanding sufficient information to judge credibility. In addition, a new industry and new government services are forming to provide clearinghouses for quality information.

Codes of ethics, too, are a growth area fueled, in part, by poor-quality information, businesses’ and providers’ fears that they will lose credibility, and the public health impact of the Internet. The eHealth Code of Ethics is one effort to lay a foundation for accountability.19 The Internet Healthcare Coalition and the eHealth Ethics Summit are developing this ethics code, a strategy to enforce it, and a means of educating providers and the public about it. The code is meant to be international, inclusive, and comprehensive, developed by an open and public process, and focused on ethics rather than law. With a goal “to ensure that all people worldwide can confidently, and without risk, realize the full benefits of the Internet to improve their health,” the Ethics Summit Working Group adopted eight principles—candor, honesty, quality, informed consent, privacy, professionalism, responsible partnering, and accountability. In line with their goals, further information about these efforts appears on their Web site, at www.ihealthcoalition.org/ethics/ethics.html.

Other ethics efforts have also been undertaken, as described in the Journal of the American Medical Association.20 Among them are the Health on the Net Code of Conduct (HONcode) for medical and health Web sites, established by the Health on the Net Foundation,21 and the principles set forth in “Health Internet Ethics: Ethical Principles for Offering Internet Services to Consumers” (2000),22 which have been adopted by Hi-Ethics (Health Internet Ethics), a coalition of sites that offer health services, products, and information to consumers in the United States.

Challenges and Implications

The search for new ways to enhance health-related communication and supplement the interpersonal relationship between clinicians and patients has important implications for medical and health informatics. For at least 40 years, informatics development has assumed the primacy of the patient–provider encounter, and applications development has focused on the needs of providers or health care institutions. Data models have been based on episodic patient encounters, and patient records have been organized
around them, rather than around the life course of the individual patient. These episode-based, provider-focused approaches leave patients confused, since they are expected to integrate their own care, services, and information while the delivery environment changes. Instead, patient-centered systems need to be organized around the person involved.\textsuperscript{23}

Consequently, medical and health informaticians need to build informatics tools that support the patient as a partner in health care and focus on the consumer, not the provider or institution. A three-way partnership is developing between patients, providers, and information systems, with synergistic interrelationships among the three.

People seek health care information from numerous sources. Innovative computer technologies are needed to support the diversity of information that is sought. The technologies should be available in the places where information is sought, and they should support communication processes that a person may use to interact with the health care system to foster a healthy life. In line with what consumers want and need, information technology tools should provide a personalized information flow between patients and providers so that patients can take an active role in managing their own health care. Furthermore, information provided in a tailored strategy that links behavior to health consequences can potentially have a favorable impact on a person's health. These services should be available with other information services on the Web.

In the process of creating such tools, consumers, providers, and informaticians must pay attention to ethical and social issues so that together they shape the future as they would like it to be, in terms of both how technology is used and what kinds of regulations are put in place. Certification and self-regulation, instead of only government regulation, are needed to ensure information accuracy and to help users evaluate the credibility of information providers and information sources.

Codes of ethics, however, can themselves be controversial. When these codes are established by industry groups, some people question whether there may be ulterior motives. Codes also can be viewed as counter-productive, because they may provide a false sense that ethical issues have been sufficiently addressed. One possible way to resolve these concerns would be to have an unbiased organization, such as AMIA, oversee the development of codes, monitor the application of these codes, and take responsibility for disseminating and revising them. AMIA, for example, could review the literature and work already done by ethicists in relevant areas. An unbiased organization also could investigate what the issues are, where people see potential trouble spots and pressure points, and possible solutions. It could help ensure that, once written and accepted, a code becomes a dynamic document conditioned by evidence and real experience and is frequently revised accordingly. Furthermore, an organization like AMIA could provide educational opportunities that such codes present.

**Recommendations**

AMIA has, so far, not been an active player in the consumer informatics arena. The panelists and Congress participants concurred that AMIA should become actively involved in consumer health informatics. They advanced the idea of expanding the provider-institution model of informatics to better address the needs and realities of contemporary patient-centered health care. To this end, panelists and conference participants proposed a number of recommendations.

The key focus of the recommendations was how to support the patient–provider–information technology partnership to provide more patient-centered health care. As part of this focus, the recommendations concerned five areas—research, new patient record systems, provider support, information access and evaluation, and policy and regulation. Enumerated below are key considerations in each of these areas.

**Research**

**Definitions, Terminology, and Roles**

As definitions and roles are changing, we need to reconsider the terminology and what messages different words convey. Some dimensions of this research area include:

- Deciding whether we are addressing “patients,” “consumers,” or “clients,” by considering what these terms imply, in what situations each is appropriate, and whether definitions shift with situations\textsuperscript{5}
- Determining how the roles of patients (or consumers? or clients?) and providers are changing,

\textsuperscript{5}This paper reflects the difficulties in choosing the appropriate term, which is why more than one of them is used in different parts of the paper. This variation was not intended to convey any particular message or definition. Appropriate use of each of these terms, and other possible ones, clearly needs more thought, and the implications require further research.
and what implications these changes have for informatics

- Defining “empowerment” by considering who is being empowered, what they are empowered to do, and for what purpose

**Design Issues**

Numerous research considerations arise in designing, implementing, and evaluating new information sources and services to empower patients. These applications may include programs providing information, decision support, patient-to-patient communication, and patient–provider communication. Research issues include:

- Determining what constitutes a “patient’s view” of information
- Determining what patients and providers want
- Evaluating what the best practices in designing information delivery are
- Researching what are effective means for knowledge engineering, so that knowledge can be transferred to the Web
- Delivering targeted, personalized, just-in-time information
- Assessing what affective messages are carried by the technology, either explicitly or implicitly
- Identifying which values are, or should be, embedded in system and interface designs

**Individual Responses and Reactions**

As the use of information and communication technology in health care spreads, we need to be concerned with how different people and groups respond to the technologies. Research issues need to be addressed with respect to:

- Discovering how different people interact with and react to different technologies (e.g., telephones, Web services, e-mail), information, and access methods
- Identifying ethical concerns

Industry, government, and social commentators are pushing for codes of ethics, while the informatics community has primarily been reactive. We need to explore the need for and utility of proposed codes. While building on current efforts, research is needed also to develop a proper foundation for identifying ethical principles.

**New Patient Record Systems**

New record systems are needed to integrate care by use of informatics tools rather than through either the patient or the provider. A new model of care should be developed to transcend the brief patient–clinician encounter, and records should be about the entire process of care. Informaticians need to design new clinical record systems that would:

- Be longitudinal, organized around the person, in addition to institutions or providers, and relevant to individual patients in managing their own care
- Situate care in the context of a patient’s life, and not only in the business of the institution, with records that extend across a lifetime and across institutions
- Allow pathways to and through information services across a number of institutions, including the kinds of records a patient keeps at home
- Link to knowledge resources that may be dynamic and frequently changing
- Integrate knowledge that patients and providers each need
- Integrate information and care across institutions, requiring a balance between information integrity and care needs
- Support epidemiologic, public health, and statistical analysis so that information could be provided back to clinicians
- Give attention to identity, security, privacy, and trust issues

**Provider Support**

Providers as well as patients need support. Conference participants suggested ways to protect providers and encourage them to use new consumer informatics technologies. To provide tools for provider support, we need to:

- Determine how providers can best teach patients to access, evaluate, and use the information that is available to them
- Create databases of information, such as disclaimers concerning information, and case and tort law pertaining to new information technology tools

**Information Access and Evaluation**

The changes in roles of both patients and providers create educational needs in each group. Both providers and patients need to learn to access and evaluate infor-
Educational efforts should include addressing consumer health informatics issues through developing informatics curricula, scheduling conference sessions, supporting working group activities, and generating or assessing standards for vetting information and standards for ethical information provision, access, and use.

New professional roles may be needed for those who teach about information quality and searching—for example, information triage nurses to review information a patient brings to a clinical encounter, and clinical librarians or educators to teach people how to get information.

Policy and Regulation

The growth of new information sources and services raises societal and governmental concerns. Groundwork needs to be laid to help ensure reimbursement arrangements that do not create disincentives for clinicians to use the new technologies; accessibility, including accessibility of language, literacy level, and technologic tools and media; a speedy and appropriate response in case of disaster; and self-regulation and control over the technology and information by providers and consumers.

Conclusions

Consumer informatics is an exciting development that is creating new challenges and opportunities in medical and health informatics. Choices must be made. How can we reap the benefits of these new developments in health care organization and technology while preserving the human side of health care? Do we want health care to be like automated banking and telephone menu systems? These changes provide exciting opportunities for considering ethical, legal, and political issues as well as for developing new information tools and services. AMIA needs to take an active leadership role in this area.

The authors thank the many people who provided the material for this report—the panelists who volunteered their time and expertise to create stimulating and informative sessions, the two notetakers who diligently wrote down what was said at each panel session, and the reporters who summarized the break-out sessions:

**Track Chair and Moderator:**

- **Bonnie Kaplan, PhD**, President, Kaplan Associates; Yale Center for Medical Informatics, Yale University School of Medicine

**Keynote Panel:**

- **Patricia Flatley Brennan, RN, PhD**, Moehlman Bascom Professor, School of Nursing and College of Engineering, University of Wisconsin–Madison
- **Joyce Flory, PhD**, President, Communications for Business and Health, Chicago, Illinois
- **Helga E. Rippen, MD, PhD, MPH**, Chair, Internet Healthcare Coalition; Co-chair, eHealth Ethics Summit; IEEE-USA Medical Technology Policy Committee. Formerly, Director of Medical Informatics, Pfizer Health Solutions, Inc.
- **Warner V. Slack, MD**, Professor of Medicine and Psychiatry, Harvard Medical School; Co-Chief, Division of Clinical Computing, Beth Israel Deaconess Medical Center; Co-President, Center for Clinical Computing.

**Commentator Panel–1:**

- **Alan F. Dowling, PhD**, CEO, Global Health Technology Inc.; Adjunct Professor, Case Western Reserve University. Formerly, Partner, Global Health Care Consulting, Ernst & Young LLP
- **Thomas K. Houston, MD, MPH**, Assistant Professor of Medicine, Director of the Section on Medical Informatics, Division of General Internal Medicine, University of Alabama School of Medicine
- **Robert H Friedman, MD**, Associate Professor of Medicine and Public Health, Boston University; Chief, Medical Information Systems Unit, Boston Medical Center

**Commentator Panel–2:**

- **Kenneth W Goodman, PhD**, Director, Bioethics Program, University of Miami
- **Gilles Frydman**, Founder and President, ACOR (Association of Cancer Online Resources), and Member, Advisory Board, Cancer Trials Web Site, National Cancer Institute; Board, Internet Healthcare Coalition; Communications Opportunity Leadership Team, National Cancer Institute; Advisory Board, Oncology.com; Board, Colon Cancer Alliance
- **Peter Temin, PhD**, Elisha Gray II Professor of Economics, Massachusetts Institute of Technology

**Note Takers:**

- **Kenneth W. Lobenstein**, ITS Research & Education Support, University of Missouri–Columbia
- **P. Zoe Stavri, MLS, PhD**, Adjunct Assistant Professor, Department of Medical Informatics and Outcomes Research, Oregon Health Sciences University

**Break-out Session Reporters:**

- **Gordon D. Brown, PhD**, Health Management and Informatics, University of Missouri
- **Christopher Cimino, MD**, Albert Einstein College of Medicine, Yeshiva University
- **Mary Lee Ingbar, MPH, PhD**, Harvard Medical School
- **Luis G. Kun, PhD**, National Immunization Program, Centers for Disease Control and Prevention
- **Harold P. Lehmann, MD, PhD**, School of Medicine, Johns Hopkins University
- **Lena Sorensen, PhD**, College of Nursing, University of Massachusetts–Boston
The authors also thank the many conference attendees whose thoughtful participation shaped the discussions. In addition, Thomas K. Houston, Kenneth W. Goodman, Helga Rippen, and Bill Stead all provided helpful comments on the manuscript, and Bill Stead gave extensive editorial assistance.

References


Further Reading

Demonstration and Evaluation of Consumer Health Informatics Applications
Widman LE, Tong D. Requests for medical advice from patients and families to health care providers who publish on the World

Ethical and Regulatory Issues


Perspectives on Involving Patients in Health Information Access


Literature Reviews and Compendia
