

GRANT
MAKERS
IN
HEALTH

GIH EXAMINING E-HEALTH

ISSUE BRIEF NO. 14

NOVEMBER 2002

BASED ON A
GRANTMAKERS
IN HEALTH
ROUNDTABLE
MEETING

WASHINGTON, DC



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Foreword

As part of its continuing mission to serve trustees and staff of health foundations and corporate giving programs, Grantmakers In Health (GIH) convened a small group of representatives from foundations, health care organizations, and the technology field to share their experiences and expertise on electronic health (e-health). This roundtable, held April 28, 2002, in Chicago, Illinois, highlighted emerging opportunities and challenges for foundations that wish to fund e-health initiatives. This report summarizes some of the key points from the day's discussion, providing both an introduction for grantmakers new to this area and offering the perspectives of some funders already experienced in funding e-health activities.

Special thanks are due to those who participated in the roundtable, but especially to presenters and discussants: David Brailer, president of CareScience; Thomas Eng, president of EvaluMetrix LLC and the

eHealth Institute; Ellen Friedman, vice president of the Tides Foundation and Tides Center; Sam Karp, chief information officer at the California HealthCare Foundation; Robin E. Mockenhaupt, senior program officer at The Robert Wood Johnson Foundation; and Deryk Van Brunt, CEO of eMedicine.

Lauren LeRoy, president and CEO of GIH, and J. Michael McGinnis, senior vice president and director of the health group at The Robert Wood Johnson Foundation, served as comoderators of the session. Malcolm Williams, former senior program associate at GIH, planned the program. Larry Stepnick of The Severyn Group, Inc. and Anne Schwartz, vice president of GIH, contributed to this report.

GIH also gratefully acknowledges The Robert Wood Johnson Foundation for its support of this program.

About GIH

Grantmakers In Health (GIH) is a nonprofit, educational organization dedicated to helping foundations and corporate giving programs improve the nation's health. Its mission is to foster communication and collaboration among grantmakers and others, and to help strengthen the grantmaking community's knowledge, skills, and effectiveness. Now celebrating its 20th year, GIH is known today as the professional home for health grantmakers, and a resource for grantmakers and others seeking expertise and information on the field of health philanthropy.

GIH generates and disseminates information about health issues and grantmaking strategies that work in health by offering issue-focused forums, workshops, and large annual meetings; publications; continuing education and training; technical assistance; consultation on programmatic and operational issues; and by conducting studies of health philanthropy. Additionally, the organization brokers professional relationships and connects health grantmakers with each other, as well as with others whose work has important implications for health. It also develops targeted programs and activities, and provides customized services on request to individual funders. Core programs include:

- **Resource Center on Health Philanthropy.** The Resource Center monitors the activities of health

grantmakers and synthesizes lessons learned from their work. At its heart are staff with backgrounds in philanthropy and health whose expertise can help grantmakers get the information they need and an electronic database that assists them in this effort.

- **The Support Center for Health Foundations.** Established in 1997 to respond to the needs of the growing number of foundations formed from conversions of nonprofit hospitals and health plans, the Support Center now provides hands-on training, strategic guidance, and customized programs on foundation operations to organizations at any stage of development.
- **Building Bridges with Policymakers.** GIH helps grantmakers understand the importance of policy to their work and the roles they can play in informing and shaping public policy. It also works to enhance policymakers' understanding of health philanthropy and identifies opportunities for collaboration between philanthropy and government.

GIH is a 501(c)(3) organization, receiving core and program support from nearly 200 foundations and corporate giving programs each year.

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Introduction

What is e-health and just what should health grantmakers do to advance or shape its future use? How can consumers access high-quality information on the Internet? Are hospitals and health plans making the best use of available technologies in the delivery of care? What are the barriers to more effective uses of information technology by consumers, patients, providers, health plans, and others? What are realistic expectations for the use of new technologies in the health sector? How do we plan for the future when the pace of change is so quick?

This report, based on a meeting held in April 2002, is intended to help health funders better understand the fluid and dynamic world of e-health. After briefly describing what is meant by the term, e-health, the report sketches out some illustrative examples of particular e-health uses. It points out several key issues regarding the future adoption of e-health technologies. More in-depth treatment of this material can be found in Eng's 2001 report, *The eHealth Landscape: A Terrain Map of Emerging Information and Communication Technologies in Health and Health Care*, as well as in the various reports under the iHealth and Technology program area of the California HealthCare Foundation (www.chcf.org).

The report then mirrors the discussion at the April 2002 meeting by turning to current activities and potential roles for health funders. Grantmaker activities in the area of e-health include disseminating technologies, promoting access to these tools, and dealing with the political and social issues

that their use creates. Within this wide-open area, there is something for all foundations, large and small. Moreover, while some foundations may pursue e-health as a dedicated area of work, others may find it more useful to consider how to integrate support for e-health into ongoing efforts to strengthen the safety net, expand access, or enhance quality of care.

The Robert Wood Johnson Foundation (RWJF) provided support for the meeting because of the pervasive influence of digital technology on health care today and its likely growth in the future. Digital technology will have a profound impact on critical issues such as access, quality, payment mechanisms, the public health infrastructure, and consumer empowerment. Some patients are already having nearly paperless experiences when they visit the physician. Health professionals are using computers to assist with discussions about diagnosis and therapeutic options. Soon physicians will have so-called smart cards that eliminate the need for paper medical records, provide direct links to the pharmacy and other ancillary services, and allow for e-mail follow-up after patient encounters. Such experiences may be the norm sooner than we might expect.

There clearly are roles for philanthropy in this fast-paced, market-driven arena. While individual foundations may have relatively little leverage on their own, together they can help resolve systemic issues, such as standardization of platforms, payer policies, access to new technologies, and privacy. Given the size and complexity of these issues, foundations will be most effective if they work together to share information, exchange ideas, and develop partnerships.

Defining E-Health

The term “e-health” is used to describe a wide range of information and communications technology applied in the health sector. This section provides an overview of these technologies and how they can be used to improve the health and health care of individuals and populations.

What Is E-Health?

Eng (2001) defines e-health as the “use of emerging information and communication technology, especially (but not only) the Internet, to enable health and health care.” Eng’s definition of functions and capabilities of e-health include the following “five Cs”:

- **content:** information (including the presentation and searching functions to help access the information) that helps promote human behavior change, informed decisionmaking, and distance learning and training;
- **connectivity:** the linking of information to clinical and biomedical researchers and other users, through clinical and public health information systems, health services and systems integration, and administrative transactions;
- **community:** peer-to-peer and person-to-person messaging, information exchange, emotional support, and community building;
- **commerce:** e-commerce and shopping; and
- **care:** self-care, care coordination and information portability, electronic health records, shared clinical decisionmaking, expert systems, disease management, and telemedicine/telehealth.

While e-health is typically associated with computers and the Internet, other e-health media include: direct mail (including campaigns where technologies, such as algorithms, are used to target the mailing to individuals meeting a specific demographic profile); print; wired and wireless phone; radio; broadcast and interactive television; fax; videotape; CD-ROM/DVD; and personal digital assistants. In the future, emerging technologies such as kiosks, pagers, video game consoles, stand alone portable devices, Internet-enabled appliances, and wearable/implantable devices will increasingly be used (Eng 2002).

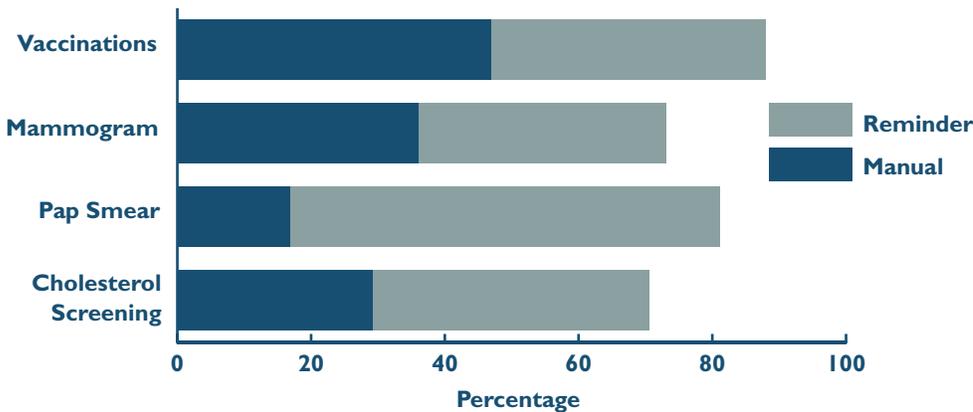
The Potential of E-Health

There are a number of ways that consumers can use e-health, including: information searching, communication with peers or professionals, decision support via expert systems, assistance with behavior change, risk assessment, disease management and self-care, distance education, recordkeeping via an electronic health record, e-commerce and other transactions, and consultations (Eng 2002).

During the roundtable, the discussion focused on several applications where e-health has the potential to significantly improve patient care and to enhance clinician-patient relationships. These include electronic medical records (EMRs), electronic prescribing, on-line communication, and care management and monitoring (Brailer 2002).

Electronic Medical Record (EMR)

Much attention has been paid to the potential of the electronic medical record to improve practice management and

Figure 1. *EMR-based Automated Reminders Improve Prevention*

Source: Brailer 2002.

patient care. Over that time, adoption of EMRs has varied widely, with large physician groups being much more likely to have the \$10 million to \$50 million in capital that is needed to put a system in place. Physician groups that practice in areas with heavy managed-care penetration, as well as those in procedure-oriented specialties, are also more likely to benefit from EMR use.

These benefits are rooted primarily in economics. Over 80 percent of those physicians who use EMRs report substantial gains in practice efficiency by reducing resources dedicated to administrative functions such as coding, billing, and recordkeeping (Harris Interactive 2001b). Those using EMRs for care management find it expensive, complicated, and disruptive to existing work flow.

Going forward, however, the EMR may become an asset in the clinical arena as well. A broad array of decision-support components can be added to EMR that can significantly enhance their contributions to patient care. For example, a 1993 study showed that automated reminder systems dramatically outperformed manual systems in their ability to get patients

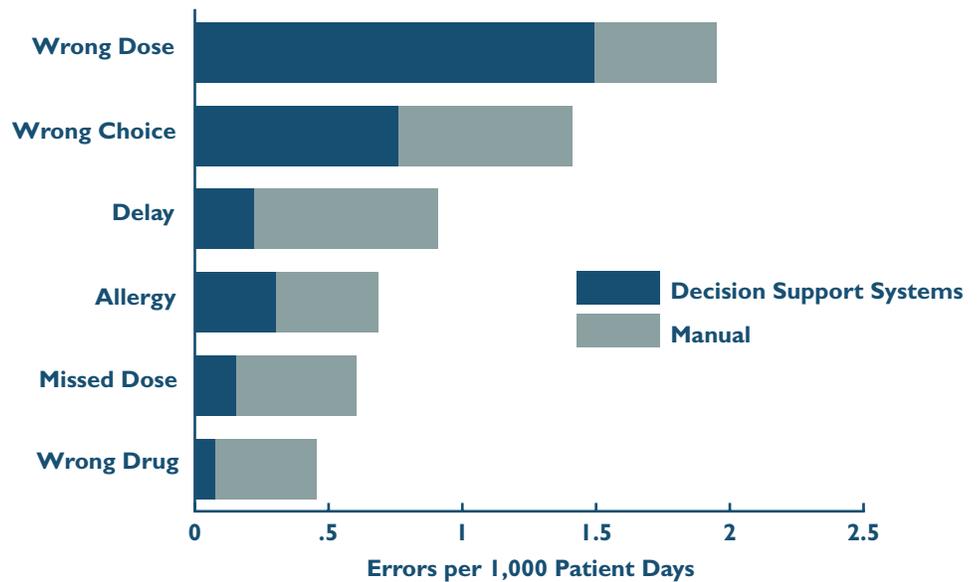
needed vaccinations, mammograms, Pap smears, and cholesterol screenings (Figure 1) (Brailer 2002).

Electronic Prescribing

Electronic prescribing is becoming more common, although adoption varies with practice size, physician age, and patient mix. As managed care increasingly requires adherence to formularies, physicians will find it easier to ensure that their prescribing patterns (and accompanying bills) fall within guidelines if they use electronic prescribing. This transition will bring clinical benefits as well. Many studies have found that electronic prescribing, in combination with decision-support systems, can reduce medical errors such as the wrong dose, wrong drug, missed doses, drug-drug interactions, and allergic reactions by 25 percent to 30 percent (Figure 2)(Bates, et al. 1998).

Some problems with electronic prescribing still need to be addressed:

- Standards for data interchange remain incomplete, which adds costs and places limits on the ability to use these systems across organizations and geographic areas.

Figure 2. *Electronic Prescribing Can Lower Adverse Event Rates*

Source: Bates, et al. 1998.

- The technology is susceptible to bias with respect to the sequencing and highlighting of drugs included in the system, as the technology's sponsors have an interest in promoting certain drugs. The Food and Drug Administration has no jurisdiction over the order of drug presentation in electronic formularies or prescribing information guidelines.
- The technology may not be useful in helping physicians figure out which patients may be appropriate candidates for a particular drug. For example, with respect to the drug warfarin, researchers recently discovered how to identify patients who are nonresponders and, thus, not good candidates for the drug. The technology is not yet able to incorporate such findings.

Electronic prescribing, in combination with direct-to-consumer advertising, will likely replace the current practice of detailing (visits to physicians by pharmaceutical

company representatives) as the primary tool for pharmaceutical marketing within 10 years (Brailer 2002).

On-Line Communication

Approximately 70 percent of consumers have expressed interest in using the Internet to get test results and drug refills, schedule appointments, and communicate with providers (Harris Interactive 2001a). This phenomenon is not confined to younger, more technology-oriented consumers. In fact, older consumers have more interest in using on-line functions than do younger people.

Consumers are even willing to pay for this capability. For example, surveys suggest that consumers will pay between \$1 and \$15 per month for the opportunity to have physicians answer their questions via e-mail. While this willingness to pay varies somewhat by income levels, more than half (55 percent) of households earning less than \$15,000 a year expressed a willingness

to pay for these services. The corresponding figure for households earning more than \$75,000 a year was only six percentage points higher at 61 percent (Harris Interactive 2001a).

Care Management and Monitoring

A variety of e-health applications can assist with care management and monitoring chronic conditions. Examples of valuable e-health applications include:

- wireless applications that monitor blood glucose levels in patients with diabetes or that monitor pacemakers;
- Internet-connected devices that provide physicians with readings from peak flow meters for patients with asthma, as well as special scales for patients with congestive heart failure and that allow for home drug dispensing; and
- telemedicine applications that allow physicians to send images to other physicians (for example, X-rays or other radiologic studies) or patients to send images to physicians (for example, skin conditions).

Most physicians (about 84 percent) believe that these types of technologies improve health status (Brailer 2002). Under current payment policies, however, their use may also hurt a physician's bottom line, creating a disincentive to their broader adoption.

Some of these technologies tend to reduce patient visits, and many payers, including Medicare, do not yet pay for them.

Some providers are finding ways to tap into the consumer's willingness to pay for these types of applications. For example, the Cleveland Clinic charges \$800 for consumers to get on-line second opinions about proposed diagnoses and/or treatment plans. The organization earned \$10 million in revenues from this service last year. While this revenue stream is still relatively small in an organization with annual revenues of \$1.5 billion, it has the potential to grow rapidly (Brailer 2002).

Population Health Applications

Discussion at the roundtable meeting pointed out the importance of distinguishing between individual- and community-based information systems.

THE POTENTIAL POWER OF E-HEALTH IN PUBLIC SURVEILLANCE

E-health has tremendous power in surveillance, as illustrated in the story of the first known bioterrorism incident in the United States, which occurred in a small Oregon town in September and October of 1984. It took several weeks before authorities were able to determine that salmonella cases were infected through restaurant salad bars deliberately contaminated by a religious cult. More timely monitoring and analysis of clinical and laboratory cases using electronic means would likely have identified the potential source(s) much earlier, allowing for prompt closing of the restaurants and a smaller number of cases (Torok, et al. 1997).

While there has been tremendous growth in the development and use of technology for personal health, fewer tools have been developed to improve community health, in part because it is not yet clear how information technology (IT) can help improve decisionmaking in this arena. The important impact of lifestyle and environmental factors on health status suggests, however, that there are many opportunities to support the application of e-health in the community (Van Brunt 2002). For example, e-health strategies could be targeted on:

- disease surveillance, epidemiology, and the monitoring of health indicators;
- public health services facilitation and outreach (for example, to underserved areas);
- community health education and social marketing for health improvement; and
- coordination, integration, and communication among public health professionals and between the health delivery and public health sectors (Eng 2002).

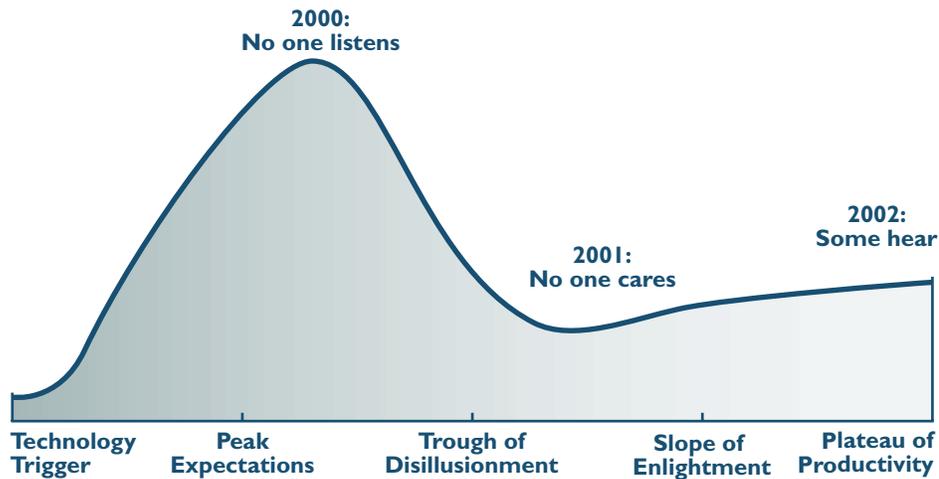
Major E-Health Issues for Today and the Future

The e-health industry is struggling to resolve several major issues that are currently limiting its growth potential. First and foremost, given the demise of many Internet companies, will e-health firms survive as commercially viable enterprises? Other important issues include: ensuring the quality of health-related information available to consumers on the Internet, enabling access to e-health services and health information for underserved populations, and ensuring the privacy and security of patient-specific health information.

Will E-Health Survive?

Given the dot com crash, it is fair to ask about the future viability of e-health, as the financial future of many current and proposed e-health applications is being second guessed.

To shed some historical light on this issue at the roundtable, David Brailer shared his interpretation of the so-called IT hype cycle within health care. Developed by John Glaser, chief information officer for Partners Healthcare in Boston, Massachusetts, this cycle suggests that interest in new technologies follows a predictable path (Figure 3). After a technology trigger, expectations rise quickly until they hit a peak. For e-health (like many other Internet-related technologies), the period of peak expectations hit in 2000. During this period, the voices of venture capitalists, who were quite optimistic about e-health, dominated the discussion and drove the

Figure 1. *The Health Care IT Hype Cycle*

Source: Brailer 2002.

upsurge in new companies. The unbridled enthusiasm of peak expectations quickly gives way, however, and the expectations of the venture capitalists drop until reaching what Glaser calls the “trough of disillusionment,” a period where there is little to no new activity. For e-health, this stage began in 2001. From that time on, expectations have begun to rise slowly again along the “slope of enlightenment,” a period when there is new interest and activity and potential consumers try to distinguish the good from the bad. E-health reached this stage in 2002. Finally, for those technologies with any merit, the final stage is a “plateau of productivity,” a period when the true potential of promising information technologies can finally be realized (Brailer 2002).

Many still believe that e-health will be an important force with a significant positive impact on health care. But several critical questions must be answered with respect to the sustainability of any proposed e-health product or service:

- Who will pay for the product or service and how much will they pay?
- What is the compelling value proposition and/or return on investment?
- What are the barriers to technology adoption?
- Are there any powerful stakeholders (such as potential competitors) who do not want the proposed venture to succeed (Eng 2002)?

Analysts also expect a shift over the next five years in the leaders who are the driving force behind e-health. A survey conducted at the November 2001 eHealth Developers Summit found that most attendees thought that established organizations (such as health plans, consumer organizations, and, to a lesser extent, pharmaceutical and medical device companies) would be the most influential players behind e-health. They expected that e-health companies, technology start-ups, and large technology companies would be significantly less important. A separate survey at the same meeting found that 84 percent of attendees felt that open-source solutions will become

increasingly important to the continued growth and development of e-health (Eng and Harris 2002).

There also may be a shift in the functions that are performed by e-health, as illustrated in the four distinct waves that are defining the evolution of the e-health sector:

- the information/content wave, which began in the early to mid-1990s and included the development of early Web sites dedicated to health and health care;
- the transaction wave, in which services and transactions (such as scheduling appointments and purchasing prescriptions or other products) are automated through the Internet. This wave began several years ago and is ongoing;

- the consultations wave, which is likely to begin in 5 to 10 years; and
- the perfect (or ubiquitous support) wave, in which integrated information/communication devices and sensors combine with increased knowledge about genomics to allow for seamless, tailored, intelligent decision support and services at any time. This wave is at least 10 to 20 years away (Eng 2002).

Quality of Information

According to a 2001 study conducted by RAND for the California HealthCare Foundation, there have been problems with both the health-related information that consumers find on the Internet and their ability to access what is available.

PHYSICIAN EXPECTATIONS WITH RESPECT TO E-HEALTH

Perhaps because of the overly optimistic hype surrounding e-health and the dot com crash, physicians see a large gap between IT rhetoric and reality. In fact, David Brailer of CareScience reported that a Wharton School survey found most physicians do not expect IT to have a dramatic impact on health care, ranking it second to last in terms of its likelihood of causing a breakthrough in health care.

Dramatic improvements in health care will depend upon both the adoption of these technologies, as well as a major restructuring of work flow. At present, physicians are trying to adopt IT into the current flow of operations, which can be a losing proposition.

Physician expectations may be slowly changing, however. Moreover, there are huge variations across physicians (by age, specialty, and other factors) with respect to their expectations about IT. Data from a November 2001 survey by Harris Interactive suggest a fair amount of interest in the electronic medical record, with 20 percent currently using EMR and another 23 percent planning to use it within 18 months. This survey found relatively high rates of physician-patient interaction on-line, with over one-quarter of those physicians surveyed using e-mail to communicate with patients. Use and planned use of IT for care management/remote monitoring and electronic prescribing lags behind (Harris Interactive 2001b).

Findings from this study indicate that:

- search engines are inefficient tools for locating relevant health information;
- answers to important questions that consumers should be able to find are often incomplete, although when information is provided it is generally accurate;
- Spanish-language health information is sparse and is less consistently accurate; and
- most Web-based health information is difficult for the average consumer to understand (California HealthCare Foundation 2001).

The report makes a number of recommendations to enrich the information and safeguard patients. These include creating expert panels to review content, presenting information that is more easily understood, developing a process for consolidation and collaboration among information providers, and developing standards to ensure that information is up to date (California HealthCare Foundation 2001).

To address these problems, numerous organizations, including the American Medical Association, have proposed standards and/or launched initiatives designed to improve the quality and consistency of information found on the Internet. But these initiatives and standards apply only to content, not to on-line tools (such as brokers that help consumers get bids for elective procedures such as cosmetic surgery) (Eng 2001).

Access and the Digital Divide

In 2001, 143 million Americans (about 54 percent) were using the Internet. Whites and Asian American and Pacific Islanders,

however, are connected to the Internet more often than African Americans and Hispanics. About 60 percent of white and Asian and Pacific Islander households are connected to the Internet, compared to 29.3 percent of African-American and 23.7 percent of Hispanic households (U.S. Department of Commerce 2002).

The gap is particularly striking in lower-income households. Nearly 80 percent of families with household incomes of \$75,000 and above had Internet access, compared to about 25 percent of families with incomes below \$15,000 (U.S. Department of Commerce 2002).

The likelihood that a family will have access to the Internet is also affected by the education level, age of the head of household, and the location of the home, with college educated, and younger heads of household being more likely to have access, and homes located in urban areas being more likely to have access to the Internet (U.S. Department of Commerce 2002).

Internet access also varies by geography. There is substantially less capacity in many rural areas of the United States. Internationally, relatively little infrastructure exists in Latin America, South America, or Africa (Eng 2002).

Going forward, it seems unrealistic to expect universal (100 percent) access to the Internet. Six percent of Americans still do not have a telephone, including 25 percent of low-income Americans. The key question, therefore, is what level of access is sufficient (Eng 2002)?

Access also has various components that go beyond physical access to infrastructure (the Internet) and equipment (a computer). Consumers only enjoy true access if they have:

- relevant content and tools,
- the ability to locate personally-relevant resources,
- health and technology literacy, and
- technical accessibility and usability (for example, for disabled populations) (Eng 2002).

Privacy and Security

One area of innovation is making patient-specific data available to providers on a real-time, as-needed basis. Several large companies are making major investments in technologies that allow clinical information to be transmitted from patient to provider through sensors and both internal and external wearable devices. For example, one large medical device company uses a wireless receiver to upload data from a pacemaker to a central server (Eng 2001).

But this vision of real-time, patient-specific transfer of data will not be realized unless adequate security systems exist to protect the privacy of individually-identifiable health information. The California HealthCare Foundation has made major investments to collect information and conduct analyses concerning these privacy issues.

Internet users have indicated serious concerns about privacy and security in a number of recent polls. These concerns include fears that a company may share personal health information without permission, health insurance plans may limit

or deny coverage based on information received from a third party, and employers may limit job opportunities for employees based on changes in their health status. These fears are real; many popular e-health sites have not met minimum fair information practices, such as providing adequate notice and giving users control over their information (Eng 2001).

Impact on the Bottom Line

Some question whether e-health will survive unless it has a net positive impact on the bottom line. David Brailer pointed out that virtually every innovation in health care adds costs (although in some cases, investing in e-health might help slow cost growth).

The key question is whether the innovation provides either better value or greater accountability. Bringing IT into community clinics in California has increased net revenue primarily by boosting throughput; clinics see more patients per day and, thus, bill more hours. While the use of EMRs has cut some costs, the savings in transcription costs and staff time are typically not significant (Karp 2002; Friedman 2002). Nonetheless, the bottom line may improve due to increased billing and fewer inefficiencies. Quality may improve as well, in part due to better interaction with patients.

With respect to workforce (which accounts for a substantial share of the expense of delivering health services), e-health and IT have the potential to reduce workforce needs, but only if there is a concomitant change in work flow. Many health care workers are undertrained and poorly equipped to process new clinical knowledge, let alone IT. Yet most IT is

simply thrown into existing work processes and, thus, does not affect use of labor (Brailer 2002).

Issues for the Future

The future promises a number of exciting developments in e-health, related to broader technology and biomedical trends, such as use of broadband and personal access networks; the convergence of wireless technologies, devices, and services; advances in genomics; environmental sensors and biosensors; and globalization. Examples include:

- Staff of the Georgia Institute of Technology have developed a wearable sensor, placed in the fabric of a vest, that monitors and records the heart rate and other important clinical parameters, and then relays the information to a separate stand-alone device or a central server.
- Miniature robots, that can either be implanted or injected, are being developed throughout the country. These robots can measure and transfer information about the body.
- New laser printers are being developed that print actual circuits onto paper or fabric. These circuits can transmit data, acting as an instant computer capable of transmitting information from the many disparate sources that now exist (Eng 2002).

The speed of e-health evolution and the future development of these trends in the U.S., however, will depend upon how quickly Americans adopt new technologies. Citizens in other countries have been quicker to embrace these technologies; for example, 40 million Japanese access the Internet using hand-held telephones

(Eng 2002). The speed of e-health evolution will also depend upon who has access to cutting-edge technologies (including who will pay and how much they will pay); whether standards or guidelines are created for appropriate use; the ultimate impact on quality, access, and costs; and how society responds to other policy, legal, and ethical issues (Eng 2002).

Other important determinants of e-health's future include the adoption of sustainable business models, changes in payment policy to allow more freedom in the use of e-health tools, realignment of incentives to empower patients and consumers, the development of model data contracts and flow control, a shift in emphasis from treatment to prevention, and changes in the roles and relationships among health professionals (Eng 2002).

Case Studies of Foundation Activities In E-Health

As an introduction to a discussion of philanthropic roles related to e-health, this section profiles the activities of three leaders in the sector. The California HealthCare Foundation has mounted a dedicated e-health initiative. The Robert Wood Johnson Foundation and the Tides Foundation have integrated e-health into other foundation activities. Their work illustrates the range of foundation activities related to e-health, including:

- providing leadership both within communities and at the state and national level, including the ability to convene stakeholders (for example, to discuss issues or share best practices) on the issue;
- developing a better IT infrastructure within health care;
- funding research and development of new applications;
- improving technology literacy among patients and providers and providing technical assistance to potential users;
- enhancing privacy and security;
- supporting demonstration projects, evaluations, and quality measurement;
- acting as a catalyst for partnerships and collaborations;
- developing and disseminating tools, research, and best practices; and
- monitoring e-health activities.

A longer list of specific ideas for funders can be found in Appendix A.

California HealthCare Foundation

With an endowment of \$800 million, the California HealthCare Foundation awards roughly \$40 to \$45 million in grants each year. Several years ago, the foundation sponsored a study by McKinsey & Co. to evaluate what was most important to clinicians in community health centers. The study found significant problems with information systems, with many physicians having trouble accessing notes on patients they saw weeks before. These physicians, and others like them, operate in a system that is incomprehensibly fragmented, void of standards, and dominated by misaligned financial incentives.

To help address these problems, the foundation made IT and the Internet one of its six primary areas of focus, with roughly \$4 to \$5 million awarded annually. It has two main goals in this work: stimulating adoption and use of IT to improve quality, efficiency, access, and safety; and evaluating policies and regulatory actions that are affected through the use of IT. The three broad areas of work are consumer use of the Internet, clinical care, and access.

Three California HealthCare Foundation projects collectively provide a sense of the foundation's activities in the e-health arena. In addition to these, the foundation has also made a major commitment to publishing and disseminating a series of iHealth reports and a daily newsletter, *iHealth Beat* (available at www.ihealthbeat.org). While some of these projects may be seen as risky, the foundation's board is fully supportive and makes use of rigorous criteria, metrics, and algorithms in determining where the

California HealthCare Foundation should allocate its resources to make a difference in areas of importance.

Privacy

The increased use of the Internet for exchanging patient-specific information has raised concerns about privacy and the security of this information. The California HealthCare Foundation is focusing on raising awareness of these issues. It has embarked on a five-year, \$1- to \$2-million initiative that includes:

- holding a series of statewide workshops in partnership with Consumers Union to get the privacy issue on the agenda of public health officials, consumer organizations, and advocacy organizations;
- sponsoring statewide meetings of key stakeholders in privacy, including clinicians and law enforcement officials;
- funding development and dissemination of 40,000 copies of a primer on privacy in health care;
- conducting a survey on patient attitudes on privacy;
- sponsoring a study on the privacy policies and protections of various Web sites;
- mounting a series of activities around the Health Insurance Portability and Accountability Act (HIPAA), including a toolkit for safety net providers, implementation guides that relate to the privacy provisions of HIPAA and California law, and a study on perceived versus real barriers to HIPAA implementation; and
- funding a report on genetics and privacy, an increasingly important issue due to consumer fears that individuals and organizations will gain access to their genetic information.

Health-e-App

Approximately 800,000 to 1 million children in California are eligible but not enrolled in Healthy Families, California's state children's health insurance program. Part of the problem is that enrollment requires completion of a 28-page application. The California HealthCare Foundation embarked on a \$3-million, 3-year initiative to remove this major barrier to enrollment by developing a more user-friendly, on-line application. Working with Deloitte Consulting, the foundation was able to automate every part of the enrollment process, reducing enrollment time to 20 minutes. After working diligently to get the governor's approval, the foundation even integrated an electronic signature into the application. More importantly, perhaps, applicants receive a preliminary eligibility determination in three seconds.

Health-e-App was successfully piloted in San Diego County, with 1,000 enrollees signing up at six clinics. Lines for service at these clinics formed the day after the sign-up program began. The error rate and time required to complete the application fell by 60 percent during the pilot period. Virtually all enrollees chose to enroll using the computer-based system.

The foundation has licensed this tool to the state of California free of charge. Statewide implementation is expected soon. Deloitte Consulting retains the right to sell the tool to other states. Thus far, Arizona and Indiana have purchased it. Deloitte and the foundation also have developed a Web-based application designed to train staff members who assist in enrolling beneficiaries.

Santa Barbara County Care Data Exchange

The fragmentation of California's care delivery system means that information is often unavailable when patients come in to see providers. Providers may have no idea if a patient has been seen previously within the community, which, in turn, leads to unnecessary delays and the provision of redundant services.

To address this issue, the California HealthCare Foundation commissioned a feasibility study on whether there is a business case to have communities share information through a communitywide EMR. The answer was a resounding "yes" in the pilot community and elsewhere.

Foundation staff then assessed vendor offerings and found no vendor-developed applications appropriate for this purpose. To fill the void, the foundation provided what it considered social venture capital to hire CareScience, Inc. to build and deploy a technology similar to that used by Napster to share music. The new technology was designed to link 17 provider sites (including physicians' offices, hospitals, laboratories, and pharmacies) in Santa Barbara. The California HealthCare Foundation has committed \$10 million over three years to this effort. CareScience and several community-based organizations are investing as well. An evaluation by McKinsey & Co. has determined that the community is already seeing benefits from the sharing of information. The foundation owns the intellectual property, but CareScience has a license to sell the technology in other states.

The Robert Wood Johnson Foundation

The Robert Wood Johnson Foundation (RWJF) does not have a dedicated e-health program, but rather integrates its e-health activities into the foundation's 10 designated areas of grantmaking. Because of the field's breadth and complexity, foundation leaders decided to start with discrete projects that would allow it to test the waters and develop a better understanding of the issues. What follows are descriptions of four projects where e-health is being integrated into an existing grantmaking portfolio. The foundation continues to explore other grantmaking opportunities in e-health.

Health E-Technologies Initiative

A research project funded by RWJF identified many Web sites and other technologies with the potential to influence behavior and improve health outcomes in chronic disease management and health behavior changes. Based on these findings, the foundation wanted to document this evidence to build the science base, particularly with respect to personal health information. Approved in 2001, Health E-Technologies is a \$10.3 million research program to test whether new technologies actually have an impact on health behavior and outcomes. Grants will be made to organizations in three different settings: providers and provider-based networks, health care organizations or systems, and voluntary and community organizations, with a focus on special populations, including racial/ethnic minorities, the disabled, the elderly, and/or low-income populations. Brigham and Women's Hospital in Boston is serving as the national program office (NPO) for this initiative.

QUESTIONS FOR FOUNDATIONS TO ASK WHEN CONSIDERING AN E-HEALTH INITIATIVE

- Is there a market failure to fill?
- Are these technologies safe and effective?
- Have they been validated?
- How is technology going to be paid for?
- Is there a gap in physician or consumer adoption of information technologies? If so, why?
- How will user fees affect adoption and benefits?
- Are the products and services culturally competent?
- What happens to the data? Will data be sold or used for marketing purposes?

The project will also create a resource center on the role of e-health in health behavior change and chronic disease management. This center will compile data from the grantee sites, as well as from other grants around the country, with a Web site linking to databases and other resources on the topic. As the NPO, Brigham and Women's will create a research agenda that will be continually updated over the life of the project. Based on its findings, the allocation of foundation funds may be modified over time.

Speech-to-Speech Translation

To promote communication between physicians and patients who are unable to communicate with each other due to language barriers, RWJF is exploring the development and dissemination of real-time, two-way translation technology. Foundation representatives have been working with a group of academic and government officials (including the Department of Defense and the National Science Foundation) to discuss the possi-

bilities for creating a portable device that would require little training and be easy to use in a clinical setting. The plan is to put together a consortium of funders to work with the foundation. Foundation staff are now gauging interest levels among potential funders. The technology will likely be developed within a few years.

HealthKey

The HealthKey project is a consortium of five states that is developing a framework and replicable model for a public health information infrastructure that protects the privacy and security of health information. Each of the five states has also embarked on specific, focused projects related to privacy and security, such as the secure exchange of information between emergency departments and across hospitals, development of a communitywide immunization registry, and connecting rural areas to a university medical center that can provide case management and follow-up services to individuals living in remote areas. While some of these projects

appear relatively straightforward, communities still struggle to forge consensus on their implementation. Each site has developed a set of lessons learned with respect to implementation. In addition, consistent application of the consortium model information infrastructure across sites has proven difficult. The foundation is exploring the future of the project and how to transfer learning to other areas.

Community Health Information/Population Health

The leadership and staff within the foundation's population health funding area are contemplating an e-health program that focuses on community health information needs. These might include general health surveillance, environmental health, food safety, population screening, injury prevention, or others. The idea would be to promote new products by supporting testing in the marketplace, bringing together representatives from academia, public health, and the investor/entrepreneurial community. The foundation would also like to support training efforts so that health professionals know how to use these technologies. Finally, the foundation also hopes to build in a clearinghouse and resource network that would serve as a virtual community of technologists, public health officials, business professionals, and investors.

Tides Foundation

The Tides Foundation is a San Francisco-based public foundation that supports progressive issues and is dedicated to social, environmental, and economic change. One of its major e-health programs is the \$53-million Community Clinics Initiative, undertaken in partnership with The

California Endowment. Like The Robert Wood Johnson Foundation, the Tides Foundation uses e-health as a tool to support other programs. In this case, enhanced IT is seen as a way to advance the foundation's broader goal of increasing the capacity, efficiency, and quality of community clinics in California, which collectively serve 2.7 million of the 7 million uninsured individuals in the state.

To date, about \$25 million has been allocated to clinics across the state. Almost all (90 percent) of these funds have gone to individual clinics to boost their internal information systems, including hardware and software, connectivity, and strategic IT planning. For example, the Tides Foundation is working to put an EMR system in place in all Central Valley California community clinics, serving a population that consists mainly of migrant farm workers.

The foundation has also supported a regional network that connects the clinics; shares infrastructure; and conducts joint training, planning, and data collection. An on-line learning community has also been created that has resulted in an interesting and valuable exchange of information across sites.

A somewhat controversial aspect of the initiative is an arrangement with CareScience, Inc. to develop an on-line technology assessment tool that evaluates vendors serving the clinics. Initially, the clinics were unhappy when the foundation decided to give what they perceived to be "their" money to CareScience. But two years later, this tool has completely changed the conversation that clinics are having about how to deal with the market.

The Community Clinics Initiative is overseen by a 14-member steering committee of clinical leaders. This group has evolved over time into a leadership body for community clinics in California, advising on how IT and data sharing can guide both operations and clinical decisionmaking. The steering committee is working to go beyond hardware and software by getting clinic leaders to rethink their operations, driving out inefficiencies through better use of information and IT.

Approximately \$25 million will be spent over a three-year period. The Tides Foundation is presently planning how to allocate these funds. Funding will likely be targeted at collaborative efforts to share infrastructure and data, with an eye toward bridging the gap between the use of technology for business purposes and for care delivery. The foundation also hopes to convince the vendor community that these clinics are a viable market for its products and services.

Implementing E-Health: Advice from the Pioneers

Throughout the April 2002 meeting, representatives of foundations and other organizations that have been e-health pioneers offered their advice on how best to implement e-health initiatives. Two themes emerged: the importance of being clear about the foundation's goals and whether the foundation should play the role of investor. Meeting participants also discussed the issue of whether e-health is an end, in itself, or should be viewed by grantmakers as a tool for achieving other ends such as strengthening the safety net, enhancing access to care, or improving quality. In practice, only a few foundations have developed dedicated e-health initiatives or programs. Those that do fund in this area typically got involved to promote other objectives (Eng 2002).

What Are Foundation Goals in the Area of E-Health?

Three different types of goals were discussed at the roundtable:

- closing gaps between the so-called haves and have nots, with respect to access to information technology;
- accelerating the development of standards for the industry; and
- providing anticipatory support for future product development.

Because e-health development is rightly viewed as a risky business, those funding e-health projects have tended to focus on the first two goals (Brailer 2002).

To Invest or Not to Invest?

Related to the issue of goals is the question of whether philanthropy should invest directly in e-health. Arguing for investment is the fact that a window of opportunity may exist while the sector remains in an embryonic stage, emerging from the dot com crash. In addition, a relatively small investment in e-health could yield enormous benefits.

On the other hand, a direct investment in e-health requires in-house technical expertise (something many foundations lack) and close interaction with the commercial sector (something some foundations may not be comfortable doing, or at least are not used to doing). In addition, any investment may quickly become obsolete due to the rapid evolution in technology. At the same time, expected benefits may not materialize as quickly as anticipated.

Lessons Learned

A particularly valuable aspect of the roundtable was the conversation around lessons learned by funders who stepped into the e-health field first. These lessons relate to both strategy (why to fund) and operations (how to fund).

Strategic Lessons

First and foremost, leaders need to develop a comprehensive vision of what they are doing, and then determine how IT can support that vision. Those who think broadly about the community are more likely to develop broad and connected IT systems. Speaking of The California Endowment's support for the Community Clinics Initiative, Laura Hogan commented, "If it looked and felt like boxes on desks, there would never have been a \$53-million investment. I'm very confident of that. So I think it's getting to the larger goals that match your mission and remembering that technology is just the tool to do that."

Grantmakers should also develop a formal strategic planning process for their e-health activities. When the legwork is done upfront, initiatives tend to have better outcomes in terms of actually getting people to use different technologies.

Boards must understand the potential benefits and risks of any proposed investment in e-health and the relationship of these investments to the foundation's mission. The board of The California Endowment would not have committed \$53 million simply to place computers in community clinics. What made the difference was cultivating their understanding of how the

technology would help improve the quality and efficiency of services provided. The Tides Foundation board had to be convinced that community health centers were truly important players in the foundation's efforts to ensure health justice and that the centers would take ownership over the vision that had been put before them. Several attendees suggested holding educational sessions with the board. Board members whose own companies take advantage of the Internet will likely be quick to understand the potential benefits of e-health.

Despite the expense, small focused investments in demonstrations can have a large impact by identifying and disseminating effective ideas. Some relatively simple things, well within the purview of even small foundations, can make a tremendous difference, such as giving an organization easier access to medical records. As another example, a small investment in wireless technologies can help to facilitate the delivery and assessment of home health services at a time when many resource-strapped agencies with limited staff are unable to adequately serve their customers. Participants were cautioned, however, that funding demonstration projects can be relatively easy compared to the challenges of dissemination and widespread implementation.

Government agencies, along with other funding organizations (for example, the Inter-American Development Bank and the U.S. Agency for International Development), represent potential partners for foundations. These agencies are also looking to invest in or promote e-health. Leaders of these organizations are struggling with a similar set of questions.

Finally, participants were reminded that grantmaking in e-health (as in other areas of health) is not just about giving money to organizations, but also about how foundations can help people to think and manage their organizations better through IT.

Operational Lessons

Grantmakers need to promote accountability for results among their grantees. One strategy for doing this is to develop a set of so-called dashboard indicators to measure outcomes. Deryk Van Brunt commented, "Accountability and the desire to promote best practices go hand-in-hand. Once you have the accountability, you want to show what you're doing." But accountability requires that grantees are engaged and feel they own the issue. For example, engaged medical directors are the key to success in provider organizations because they fuel the convergence between two IT paths: the technology path (which is fueled by the desire for administrative efficiencies) and the outcomes path (which is oriented at improving care delivery).

Access goes beyond hardware and software. First, while low-income individuals (as well as the organizations that care for these individuals) have less access to e-health than others, simply giving away computers and software will not solve the access problem. Technical assistance and other tools will still be needed to overcome other barriers, such as health literacy. And there may be little foundations can do (other than advocating policy changes) to address the barriers created by payment mechanisms that do not provide reimbursement for e-health activities. Second, affordability is not the only barrier to use. Ease of use is equally important. Sam Karp from the

California HealthCare Foundation noted that, “There are fewer barriers with respect to physical access to technology, but more barriers in terms of what to do with the technology.”

Grantmakers should think twice before building databases that do not communicate with others. The silo approach is all too common, creating burdensome redundancies in data collection that cause some stakeholders to drop out of programs. For example, the Centers for Disease Control and Prevention has 78 different surveillance systems. While the challenges of creating shared access to a single system are significant, the silo approach (for example, single disease registries) must stop.

Do not think of new technologies as being complete substitutions for old ones, cautioned several meeting participants. Technologies are unlikely to be a complete substitute for existing practices. In reality, there will be a balance, with some aspects being replaced and others enhanced by the innovation. Moreover, time and resources must be allocated toward continuous IT training that is integrated into the organization. Sam Karp of the California HealthCare Foundation and Robin Mockenhaupt of The Robert Wood Johnson Foundation both noted that it is less about the application and more about the people and the organizations.

Given the rapid changes in technology, foundations may find it challenging to avoid having their investments in e-health become obsolete. Meeting participants had several thoughts on how to address this issue. First, funders, like venture capitalists, should try to have broad and balanced portfolios, reducing the risk associated with

bad bets. Second, insist on continual updating by grantees. RWJF’s research agenda in e-health is constantly being modified. The California HealthCare Foundation requires its grantees to maintain and update their technologies to avoid obsolescence. Technologies are built in a modular way to make updating and expansion easy. Third, it is important to look for flexible partners. The Tides Foundation screens its potential partners for organizational factors, such as change management and leadership, that indicate a willingness to make midcourse corrections. Other suggestions were more specific, such as building in a budget for depreciation of hardware and software, using outside experts to review large projects before they are funded, being careful not to lock into specific standards that may change or be replaced over time, and supporting technologies that easily integrate and communicate with other technologies, thus ensuring interoperability. Despite all these efforts, however, foundations will sometimes have to spend additional dollars to stay current. For example, when the Bush Administration released new privacy proposals, the California HealthCare Foundation had to allocate additional funds to update its privacy guides.

A particular challenge for funders new to e-health is how to secure appropriate technical expertise. Some foundations may have in-house technology staff to review proposals, bid sheets, and the like. Others benefit from having technology-savvy executives. But most foundations will, at times, turn to outside consultants to assist with technical issues. In fact, the Tides Foundation and the California HealthCare Foundation, both of which have technical

personnel on staff, still make use of consultants on an as-needed basis, making sure that the consultants understand the organization's mission. The California HealthCare Foundation also trains all program staff on basic technology issues, such as EMRs and practice management systems.

Conclusion

Foundation leaders should not think about e-health in isolation, but rather consider building e-health strategies and technologies into different existing program areas. E-health initiatives can be considered a means of accomplishing the larger goals in an organization's mission statement. This way of thinking helps to integrate e-health into all of the other work that is being done, instead of e-health becoming a separate project that only certain people think about.

Foundations also should consider the benefits of working collaboratively, from having a continuing dialogue to active sharing of information to cofunding. It is critical to put ideas on the table, so that there is a lively flow and exchange of information, and, over time, an expanding circle of grantmakers who come into the e-health arena. To facilitate this collaboration, there may be a need to develop a resource center or clearinghouse to catalogue various foundation activities and serve as a means of allowing foundations to communicate more easily with one another. This approach will help prevent unnecessary duplication of effort and serve to put potential partners in touch with one another.

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APPENDIX A. Specific Ideas for Funders

There are many roles for foundations to play in the development, adoption, and evaluation of e-health.

Promoting Specific Technologies

Foundations that want to play an active, aggressive role in e-health can directly promote a specific technology, including those that enhance connectivity across stakeholders or communities. For example funders can:

- promote implementation of leading-edge technologies in local communities. Funders could be instrumental in replicating Health-e-App in other states, for example.
- develop software and other information systems to strengthen the public health infrastructure, including systems for dealing with public health threats within the U.S. and from abroad. For example, the Kansas Health Foundation funded the Kansas Integrated Public Health System, in partnership with the federal Centers for Disease Control and Prevention and the Kansas Department of Public Health, to develop and install a comprehensive public health information system to enhance the quality, effectiveness, and efficiency of public health practice.
- consider investing in hardware or software development to frame the way providers use data, or as a means of creating a framework for thinking about what kinds of needs can be met through different e-health applications.
- create areawide electronic medical record systems, particularly around certain target populations or different groups (for example, the uninsured, migrant workers). Data from these systems can potentially be used to develop better profiles of these populations for policymakers. For example, the Deaconess Foundation awarded a grant to the St. Louis Public Schools Foundation to catalog student health records on-line and to provide computers and training to public school nurses. The computers will be placed in 109 city schools and will be networked with custom health care software to track student health needs and treatments.
- strengthen internal information systems and improve connectivity between different types of organizations, providers, public health agencies, and community health centers.
- develop networks to gather information and data about the community, throughout the community, or about different segments of the community.
- fund evaluations of specific technologies. Private companies seldom have the appropriate incentives to set aside adequate funding for carefully-constructed evaluations of what is built. As a result, the industry tends to rely on anecdotes of success. For example, The Commonwealth Fund awarded a grant to the University of Colorado to study attitudes, expectations, and experiences of patients with congestive heart failure who are provided access to their electronic medical record (EMR) via the Internet. The objective is to evaluate the effect of

EMR availability on patients' understanding of their condition, their ability to provide self-care, and their confidence in doctors' care.

Promoting the Sharing of Ideas Across Stakeholders

A more traditional role for foundations is to promote the sharing of ideas about e-health across stakeholders. For example, health grantmakers might choose to:

- identify, evaluate, and disseminate best practices in e-health (for example, on providing information to consumers on the Internet).
- convene stakeholders (including government officials, physicians, representatives of managed-care organizations, and others) at the local and national level to work collaboratively, thus facilitating a thoughtful approach to current and future e-health applications that ensures privacy, quality, and accessibility, and relies on standards.
- assist local researchers, developers, and other stakeholders in connecting to the national conversation about activities related to data standards, accessibility, and other important issues.
- convene and facilitate a conversation among different stakeholders in the community to think about their information needs and how information could be shared to strengthen communities and improve health.
- support conferences where attendees come together from different parts of the health care system to share information on how they are using IT.
- disseminate information and tools that have already been developed, such as the California HealthCare Foundation's

iHealth reports, *iHealth Beat* newsletter, *Primer on Privacy*, or HIPAA tool. Any grantmaker can get access to these already-developed materials quickly.

- address technical issues around collaboration, coordination, and agreement on the development of different types of data registries, data collection, and data sharing across organizations and communities. Facilitating conversations on these types of issues can help a community to get over the hurdles associated with joint data collection and sharing.

Using E-Health to Serve the Underserved

Another potential role for foundations is to make e-health strategies available to underserved populations by:

- promoting initiatives to improve access to information systems among low-income individuals and nonprofit organizations;
- sponsoring evaluations of the implications of the development of new applications on current policies and future policy needs;
- helping community clinics best use the resources that are going to be made available through the federal funding for community health centers. President Bush's program to expand community health centers by 1,200 sites over five years represents a major opportunity for funders to get involved in promoting e-health within community clinics. This massive infusion of funding creates a huge need to help clinics think through issues related to infrastructure investment. Many of the communities that will be home to these new centers are underfunded and in need of foundation support of education and infrastructure.

Promoting Education and Training for E-Health

Foundations can promote education and training for e-health among key stakeholders and organizations, as outlined below:

- develop and disseminate information on technologies, including sponsoring provider education and training the future health workforce on the use of different e-health applications.
- make available technical assistance on IT issues, including helping potential grantees or other organizations in asking the right questions for planning and development of effective programs.
- help people think about and manage their organizations more effectively so that they have a clear vision about how e-health fits into their organization.
- hold educational workshops for internal program staff, trustees, and people in the community. Internal education may be a good place to start so that foundation staff feel comfortable with e-health and understand how e-health tools might be helpful in promoting the goals of other programs. Trustees also need education, as they will ultimately make decisions on allocating resources to e-health.

Community education can help forge relationships and a common understanding with groups that may one day be potential partners.

- assist educational institutions, including medical schools, residency programs, and public health schools, in their efforts to better train medical students and residents on e-health and information technology. For example, The Flinn Foundation provided a grant to the Arizona Health Sciences Center to create a 24-hour computer resource center for

medical students and faculty. The resource center provides medical education software, access to Internet resources including on-line courses, digital media creation hardware for presentation preparation, a scanner, and a color laser printer. Medical students also have access to the computer-based testing software used by the U.S. Medical Licensing Examination Board.

Promoting Population-Based Health

Health funders can:

- promote the appropriate evolution of genomics and personalized medicine, in terms of technology development and dissemination and the resolution of the social, legal, and ethical implications that arise from such activities.
- promote development of on-line community risk assessments.
- fund development of a database of what does and does not work in community e-health. An Internet-based template could be made available to all communities.
- support Geographic Information Systems mapping, which provides discharge data and other information by ZIP code. This information can be quite helpful in assisting communities in evaluating health status and identifying high-priority needs.
- support the rapid transmission of relevant information to communities.
- assist public health departments in preparing for bioterrorism. For example, The Robert Wood Johnson Foundation is working with the National Governors' Association and other organizations to develop an approach for assessing vendors of products related to bioterrorism sur-

veillance and information sharing. Interest in these types of activities has been growing rapidly since the terrorist attacks of September 11, 2001. Several years ago, the California HealthCare Foundation developed a study that investigated the possibility of developing a single system for bioterrorism surveillance. At the time, however, interest in the issue was insufficient for the foundation to attract key stakeholders to a meeting on the topic. Today, the same report is being used as a blueprint to develop plans on future bioterrorism surveillance.

Facilitating the Market for E-Health Services

Foundations may be able to play a role in making the market for e-health services work better. For example, foundations can consider playing the following roles:

- developing tools for assessing vendors that assist providers and public health agencies in making educated decisions about purchasing and using technology products and services;
- identifying different parts of the market that vendors may not consider viable, such as community health centers, and encourage vendors to think how these segments could benefit from and use technology; and
- collaborating to forge data interoperability. Depending upon how systems are structured and data are inputted, data from one system can often easily be shared with other systems. For example, one database that took four years to build was transferred to another system in two hours. Grantmakers can facilitate interoperability, at a minimum by sharing best practices on what does and does not work. Better still, grantmakers can promote the development of toolkits that instruct on how to build systems where data can easily be shared.



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