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E-health



Connected Health Requires a Robust Communications Infrastructure

Joseph C. Kvedar, MD
Center for Connected Health

Health care is changing rapidly

We are at the tipping point for adoption of an exciting, refreshing new way of providing healthcare – Connected Health. Since we all have such a personal stake in health care (we are all patients at some point in our lives), this is directly relevant to all of us. Connected health is about bringing care to you the patient, wherever you are and just in time – when you need it. Think of the power and convenience that offers! Current successful examples of Connected Health include:

- The management of patients with chronic illnesses, such as congestive heart failure, using monitoring technology in the home
- Employee self management of hypertension using a monitor that wirelessly transmits blood pressure to the healthcare provider; data can then be aggregated and presented to the patient in trended form and in the context of what his/her blood pressure readings mean to his/her overall health, and
- A glowing decorative piece of furniture that changes color according to whether the patient has taken his/her medication that day.

Connected health unlocks value by taking patient care out of the bottleneck that we know as the doctor's office. Most people find that their health care experience is unpleasant and they cite inefficient systems, long office waits and inconvenient appointment scheduling among the reasons. Connected health dispenses with all of that.

So, what are the remaining stumbling blocks?

Most of the time when people ask me about this, I tell them about the need for a new economic model that rewards quality as opposed to quantity. Progress is being made on this front and I am going to forgo that discussion here. Instead, I'm going to focus on another stumbling block. This one is more about relationships and caring. Health care, when it is at its best, is about caring. And, the communication of caring is most effective when people are together, when they can see each other's eyes, read facial expressions, body language and the like. If we are going to truly move health care out of the office to where the patient is, we need to find a way to transport all of the aspects of caring to the patient, along with monitoring their vital signs and sending them text message reminders. The other part of this challenge is that we need a way to do it that

extends the provider work force, i.e. makes providers more efficient. This is because we are in provider shortage mode now and will be for the foreseeable future.

There may be novel ways to communicate emotion and caring that will be discovered, but in the meantime if we are going to enhance text communications with more real visual cues, we will need reliable high bandwidth communication to do so. The penetration of broad band is growing in the US, but we are woefully behind our European neighbors and improved health care is one reason we need to catch up.

Just to recap the logic here, we have unprecedented growth in chronic illness in the face of worsening provider shortages. The bottleneck is right in the doctor's office. If you continue to have to travel to the office for a face-to-face visit in order for health care to 'happen', the current primary care crisis is only going to worsen and the system will grind to a halt. So we have no choice but to move care to where the patient is. In order to really achieve that goal, we need not just to monitor our patients but to CARE for them. That requires image/video rich communication and that in turn requires ubiquitous, reliable high bandwidth.

At the Center for Connected Health, we are engaged in a number of initiatives designed to bring care to the patient where the patient is and when the patient needs it. The substrate for all of these is the growing challenge of chronic illness. As providers, we are highly motivated to improve care for chronic illness and those who pay for health care are motivated as well.

Our experience caring for patients with congestive heart failure is most promising. Using a toolset that includes daily weight, blood pressure, heart rate and pulse oximetry, as well as some information about daily activity level, we're able to improve the quality of patient care, decrease the need for skilled nursing visits and decrease costly re-admissions to the hospital. All of that equates to improved quality at lower cost.

Similar results have been noted with monitoring of glucometer readings in diabetics. We are also seeing promising results in a program where employees with hypertension can monitor and self manage their condition.

All of these examples are low hanging fruit. As we increase both the complexity of illness we deal with online, as well as the richness of the emotional interactions, we will need more and more bandwidth. That is why it is so important that broadband internet access spreads in this country.

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Chronically Ill Lack Internet Access

By Donna Howell

Investor's Business Daily

10/8/2007

A chronic health problem affects one in five Americans. When it does, almost all who are able head online to figure out what to do.

Such people voraciously seek to learn, a new study finds, and are more eager than others to share knowledge to help fellow patients. At the same time, many chronically ill — who in general are older and less educated than the general population — lack Internet access.

“Only about half of people with chronic conditions go online compared with 70% of the general population,” said Susannah Fox, associate director at the Pew Internet & American Life Project. “But once they’re online, they’re enthusiastic users.”

The proof is that while 79% of Internet users have looked online for specific health information, 86% of the chronically ill have done so, says Pew, which has long studied the Internet’s impact on society. Its report came out Monday.

Huge Costs Ahead

The need for reliable health information is clear. America’s disease burden keeps weighing heavily. The most common chronic conditions — cancers, diabetes, heart disease, hypertension, stroke, mental disorders and pulmonary conditions — could cost \$4.2 trillion annually by 2023, up from \$1.3 trillion in 2003, says the Milken Institute. The amount is due largely to lost productivity, not treatment costs.

Nipping conditions early could save \$1.1 trillion in 2023, says Ross DeVol, director of the Milken Institute Center For Health Economics.

“We could prevent essentially 40 million cases of these chronic conditions,” he said.

When the chronically ill go online, they trade information about treatment with others.

They often act as information watchdogs for people in the same boat, to guide them to reliable resources, Fox says.

“If you are looking for a diagnosis, then everyone recommends you start with a doctor,” she said. “But if you’re looking for home care tips — how to deal with chemotherapy, how to prevent infection from having an IV — it’s often material you find online from fellow patients who are just ahead of you on the path.”

Along with its own survey, Pew collected essays from 1,680 members of the Association of Cancer Online Resources. This nonprofit runs online health-support forums.

Like others, people coping with chronic conditions can get frustrated trying to find information.

In Pew’s study, 30% said they felt overwhelmed by the amount of information they found online, 19% felt confused and 9% got frightened by the serious or graphic nature of what they found.

“The problem is not that we don’t have enough information. We have tons. It’s not categorized. It’s in complicated language,” said Vish Viswanath, an associate professor at Harvard’s Dana Farber Cancer Institute. “Last time I typed ‘cancer’ at Google, I got 15 million hits. The question is, ‘Where do I begin?’ “

Typing in “cancer” at Google.com now yields 78 million hits.

Viswanath thinks of the chronically ill as haves, who can access the Web to research, and have-nots. The latter can’t access information online or can’t process it, and education and income levels play a role.

For the haves, he says the Internet has been a big help.

“For them, the cancer information on the Internet has been quite beneficial, either in learning more about a particular treatment, to learn more about diagnoses, drugs and so on. It also has been helpful for them in communicating with people facing similar conditions,” Viswanath said. “If I’m facing some bad symptom in the middle of the night, I can go online and someone will answer and say something that is positive.”

Inequalities Of Information

Viswanath fears for the have-nots.

“People who suffer disproportionately from the disease burdens such as cancer also are those who suffer from inequalities in information,” he said. “We’ve shown that in our research.”

Seniors, who typically have the most health issues, tend to use the Web differently from others, says Tobey Dichter, founder of generationsonline.org. The nonprofit provides

software to retirement homes and senior centers. It aims to help older people teach themselves how to use the Internet.

The seniors Dichter works with are typically task oriented, she says, so a medical issue often leads them to start using the computer.

Pew's study found that people with chronic conditions were more likely (40%) than those without (29%) to say they know someone who has been significantly helped by online health information.

Among the ACOR essays Pew collected was one from "a man who described how his wife was paralyzed because the doctor basically missed a diagnosis," Fox said. "Because he was part of a listserv (online support group) on ACOR that discussed this kind of condition, he was able to prevent another person from becoming paralyzed."

The essay related: "Recently on the list a new person described his wife's symptoms. They were identical to what my wife's had been. I advised him to demand a full MRI of the spine and they found a plasmacytoma on her spine. They caught it in time to avoid the paralysis my wife has suffered. I feel good about that."

UC Merced To Digitally Link Rural Health Centers

By Doug Hoagland

September 26, 2007

The University of California at Merced will use nearly \$1 million in grants to digitally connect four rural health centers in the San Joaquin Valley with specialists in Valley cities and other UC schools, university officials announced today.

In a region suffering a physician shortage, patients will benefit because they can tap the expertise of specialists such as dermatologists, psychiatrists and urologists who don't practice in their communities.

The system is called telemedicine.

Rural doctors can use it to hold real-time videoconferences with specialists while examining patients or to store and forward patient information to specialists for review.

UC Merced also will use the money to plan expansion and operation of a telemedicine network, which university officials say will play a bigger role in future health care.

The four rural health centers — which could be clinics or small hospitals — will be chosen by spring of 2008 and connected to specialists soon after, university officials said.

The grants come from three sources: \$500,000 from AT&T, \$250,000 from the California Partnership for the San Joaquin Valley, a task force trying to improve the region's economy and livability, and \$200,000 from the California Emerging Technology Fund.

The fund was formed after the merger of SBC and AT&T, and of Verizon and MCI. As a condition of the mergers, the companies will give the fund a total of \$60 million in the next five years. The money will be used to extend broadband to communities in rural and urban California.

Los Angeles Times

Aging Under A High-Tech Eye

By Linda Marsa

October 11, 2007

Carol Roberts' 77-year-old mother is active and mentally sharp, but she suffers from a seizure disorder that requires close monitoring. "She didn't want to lose her independence, but she was apprehensive about living alone," Roberts says.

One option was assisted living, but then Roberts heard of an alternative: new technology called the GrandCare System, which uses strategically placed home sensors to record motion in key spots such as the bathroom, entryway and bedroom. "She can live in her own space, and I don't worry," says Roberts, who can monitor motion via computer and notice if, say, her mother has wandered out the front door, possibly disoriented.

Such technology is just one example of the so-called "aging in place" movement driven by baby boomers who are growing older. Other emerging systems include floor sensors that can track footstep patterns and detect changes that warn of potential falls and more elaborate setups that integrate webcams and video conferencing systems with the Internet.

Scientists at universities and corporate research labs are also experimenting with the next wave of smart house gadgets that track whether medication is being taken, help with cooking and other routine tasks or act as surrogate sitters that can detect problems and call for help. The goal is to help seniors live safely at home and feel protected while still maintaining their autonomy. For adult children, the goal is peace of mind.

The aging in place movement is gathering momentum because of several ominous demographic trends. In 2011, the oldest boomers will turn 65, and over the next two decades, the ranks of the "oldest old" are expected to balloon exponentially. This advancing age wave will place an enormous burden on the U.S. healthcare system at a time when there's a growing shortage of doctors, nurses and caregivers. Assisted living and skilled nursing facilities can't be built fast enough to accommodate everyone -- and even if they could, the costs would be astronomical.

"Corporations and government policy makers realize that as the boomers age, the costs won't be sustainable if we continue to do business the way we're doing it right now," says Majd Alwan, director of the Center for Aging Services Technologies in Washington, D.C.

The way to bridge this gap is to create an entirely new paradigm of care, experts say, and make it possible for seniors to remain in familiar surroundings until the very end.

“There is an intrinsic value to the home, where the individual has a sense of accomplishment and a level of comfort that they will never replicate by moving,” says Peter Bell, executive director of the National Aging in Place Council in Washington, D.C.

Technology is paving the way. We’ve already come a long way from the electronic pendants and bracelets with panic buttons the elderly can press in case of an emergency. Some of the products that recently hit the market allow families to keep an on eye on older loved ones from a distance, and others use elaborate networks of sensors to detect unusual activity. This technology, experts say, provides peace of mind for the elderly, whose biggest fear is of falling and being unable to get help.

Costs are reasonable, ranging from about \$200 for a no-frills sensor network to about \$2,000 for more elaborate setups. Because these products have come on the market within the last two years, their use isn’t widespread. “But they should become more popular,” says Alwan, “especially as the systems become more integrated.”

When Olga Zaffos left her front door wide open, her daughter and son-in-law knew immediately. A video camera strategically positioned in the 87-year-old Oklahoma City woman’s living room transmitted an image of the door to a dedicated computer in the couple’s nearby home. And if Olga wants to see her loved ones, she doesn’t need to be computer literate -- all she has to do is sit in front of the camera if she wants to chat.

Reminders to take her medication are flashed periodically on a computer screen that sits in her living room. If Olga’s family wants to check in, or a message is displayed, a distinctive ring that is recognizable even to people suffering from severe dementia sounds.

When Olga’s daughter and son-in-law, Deidre and Steve Downham, send photos of family outings, they’re displayed on the monitor, which keeps her in touch with grandkids and other family members.

“I check on her several times a day just to make sure she’s OK,” Steve says.

The monitoring and video conferencing system, called AttentiveCare, is deceptively simple: A webcam is hooked up to a computer with a flat-panel TV monitor, and the data is sent via a broadband Internet connection.

AttentiveCare was originally devised by three brothers, using off-the-shelf equipment, after their mother, who lived hundreds of miles away from them, was diagnosed with Alzheimer’s. The family stepped up in-home care as her condition deteriorated, but because they could keep tabs on her round-the-clock electronically, she was able to live out her days at the family farm in rural Arkansas until she died of cancer at age 86 in 2004.

“I had coffee with her every morning and got her day started,” says Ken Nixon, one of the brothers and chief executive of the Oklahoma City-based Caregiver Technologies Inc., which makes AttentiveCare. “It made such a difference in my life and in the life of my mom because it kept her engaged and made her feel valuable.”

AT&T’s Remote Monitor uses webcams to watch over the living room, kitchen or front door, and motion sensors to register when a door to a room opens. The system, which some use for home security, can even turn lights on and off in the house and check to see if someone left a coffee pot on the stove. If a senior wants some privacy, he or she can turn the cameras off.

“But most people feel the sense of security is a worthwhile trade-off for the loss of privacy,” says Steve Loop, executive director of business development for AT&T in San Antonio, Texas.

Another system called QuietCare uses five to 10 sensors positioned throughout the home -- near the bedroom door, bathroom, refrigerator door or family room -- to track movement. Sophisticated computer systems are used to establish a person’s behavior patterns. If there is a change in habits of daily living, such as when a person gets out of bed or how much time he or she spends in the kitchen or bathroom, the system will send out an alarm to alert caregivers.

In addition to using sensors to monitor daily activities, the GrandCare system that Carol Roberts uses has a small computer that connects to the Internet and plugs into the TV. Family members can share photos, fire off e-mails and send reminders about taking medicine or doctor’s appointments on a dedicated TV channel.

Home Guardian uses a device that was originally developed by University of Virginia researchers. It analyzes footstep patterns to detect falls and early warning signs of certain diseases.

The book-sized box sits on the floor and contains a sensor that measures tiny vibrations, and a microprocessor that learns a person’s normal walking habits. A specialized software program can spot changes. If a person falls or begins limping or shuffling, which can be symptoms of Parkinson’s disease or arthritis, the device sends an electronic message to a computer; the message is then transmitted to a monitoring service or the caregiver. The system should be available sometime next year.

Even with advancements, the systems aren’t foolproof.

Experts worry that they can provide a false sense of security, especially if someone falls and the alarms fail to go off. Plus, there is a loss of privacy.

“Some seniors have used a hanky to cover the camera,” Alwan says. “But privacy is relative, and most feel it’s an acceptable price to pay to avoid being institutionalized.”

A host of other innovative technologies are in the research pipeline. At the Aware House, a cozy, home-like laboratory on the campus of the Georgia Institute of Technology in Atlanta, scientists are dreaming up the next generation of high-tech tools to keep seniors connected.

The Digital Family Portrait is an in-home monitoring system that keeps family members informed about their elderly relative's activities, health status and possible problems. The system creates a visualization of the person's day, displayed on a monitor in the caregiver's home. Icons on the screen change daily to reflect information about the older adult's life.

Dude's Magic Box is designed to help grandchildren interact with their grandparents. Children can put an item, such as a pet hamster, in the box, and the box takes a photo of it. Dude, a cartoon character, pops up on the screen and asks the children if they want to send the photo to Grandma. Then the photo is transmitted to the grandparent's home, and a message pops up on a flat-panel screen or home computer.

"Both of these devices are designed to make the senior who is living alone feel less isolated and reassure their children that they're OK," says Elizabeth D. Mynatt, a computer scientist at Georgia Tech who helped develop the tools.

In Portland, Ore., researchers at Intel's Health Research and Innovation Group are creating gadgets that provide a safety net for seniors living alone and memory aids so they can stay connected with friends and family.

One of the products under development is a presence lamp that can be installed in the home of a person in the early stages of Alzheimer's disease as well as in the home of his or her caregivers.

When the senior is home, the light goes on in the home of their caregiver, and vice versa.

"It comforts people to know that someone is around if they need help," says Eric Dishman, general director of the Intel lab.

Another device Intel is testing, which Dishman has dubbed "caller ID on steroids," provides memory prompts to people who have dementia.

A computer plugged into a land line phone contains information about the key people in the elderly person's social network. When they call, their name will pop up on the screen, along with their photo and a brief description of who they are.

"This gives people enough confidence to answer the phone and engage in a conversation," Dishman says.

Although the technology is still in its infancy, these are important first steps toward averting the potentially catastrophic consequences of an aging population.

“The overall thrust is to increase the quality of life and of care that seniors receive in their home,” says Alwan of the aging center, “and ease the burdens on their families and on society in general.”



NEWS

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This is an unofficial announcement of Commission action. Release of the full text of a Commission order constitutes official action.
See MCI v. FCC, 515 F 2d 385 (D.C. Circ 1974).

FOR IMMEDIATE RELEASE:
November 19, 2007

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FCC LAUNCHES INITIATIVE TO INCREASE ACCESS TO HEALTH CARE IN RURAL AMERICA THROUGH BROADBAND TELEHEALTH SERVICES

Washington, D.C. – To significantly increase access to acute, primary and preventive health care in rural America, the Federal Communications Commission today dedicated over \$417 million for the construction of 69 statewide or regional broadband telehealth networks in 42 states and three U.S. territories under the Rural Health Care Pilot Program (RHCPP).

Broadband deployment is one of the Commission's top priorities – particularly in rural America. And nowhere is the need for broadband greater than in rural healthcare, where isolated clinics can save lives by using advanced communications technology to tap the expertise of modern urban medical centers.

The Commission's RHCPP will support the connection of more than 6,000 public and non-profit health care providers nationwide to broadband telehealth networks. The health care facilities participating in the Pilot Program include: hospitals, clinics, universities and research centers, behavioral health sites, correctional facility clinics, and community health centers.

Telehealth and telemedicine services provide patients in rural areas with access to critically needed medical specialists in a variety of practices, including cardiology, pediatrics, and radiology, in some instances without leaving their homes or communities. Intensive care doctors and nurses can monitor critically-ill patients around the clock and video conferencing allows specialists and mental health professionals to care for patients in different rural locations, often hundreds of miles away.

The networks will deliver services efficiently, reduce costs and travel time for consumers, decrease medical errors, and enable health care providers to share critical information. Rapid and coordinated responses to public health emergencies, such as bioterrorism attacks, pandemics or disease-related outbreaks, will be expedited through coordination with the U.S. Department of Health and Human Services (HHS), the U.S. Centers for Disease Control and Prevention, and other public health officials during public health emergencies.

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In addition, participants are required to implement, where feasible, health information technology standards as set forth by HHS. This will help advance the President's goal of creating a national system to support patients' electronic health records.

Participants are eligible for universal service funding to support up to 85 percent of the costs associated with the design, engineering and construction of their broadband health care networks. The Pilot Program's requirements complement HHS' nationwide information technology initiatives that support the creation of a nationwide interoperable health information technology infrastructure to improve the quality of health care. These networks may connect to the public Internet or to one of the nation's dedicated Internet backbones: Internet2 or National LambdaRail.

In order to ensure quality and efficiency, all projects must be competitively bid, and are subject to quarterly reviews, and stringent oversight and audits.

Attached is the full list of organizations qualifying for support in the pilot program. Health care providers were selected for participation in the pilot as set forth in the *2006 Pilot Program Order* pursuant to section 254(h)(2)(A) of the Telecommunications Act of 1996.

Action by the Commission, November 16, 2007, by Order (FCC 07-198). Chairman Martin, Commissioners Copps, Adelstein, Tate and McDowell, with Chairman Martin, Commissioners Copps, Adelstein, Tate and McDowell issuing statements.
Docket No.: 02-60

Wireline Competition Bureau Staff Contact(s): Thomas Buckley, 202-418-0725; Jennifer Prime, (202) 418-2403.

-FCC-

News and other information about the Federal Communications Commission
are available at www.fcc.gov.

***Advancing Healthcare Through Broadband:
Opening Up a World of Possibilities***

A White Paper for the Internet Innovation Alliance

**By Neal Neuberger, CISSP
President, Health Tech Strategies, LLC**

About The Internet Innovation Alliance

The Internet Innovation Alliance is an association of nonprofit groups, business associations, consumer advocates, think tanks, corporations and technology leaders who believe in the power of the broadband Internet to improve Americans' lives by enabling innovation, next generation services and service providers, and more competitive American jobs and firms. IIA members are committed to enabling Internet-based innovations by identifying and generating consumer support for wise public policy decisions.

Executive Summary

As the United States works to improve the quality of and access to its health care system, it is increasingly clear that expanded broadband service can enable improved care at a reduced cost for more people.

Among the most advanced initiatives using broadband to improve health care is enhanced medical recordkeeping that knits together electronic databases, giving patients and authorized providers instant and centralized access to information such as health histories, treatment regimens and medical images.

Digital records available over high speed networks can reduce waste, improve patient outcomes, and cut costs. Telemedicine applications that enable real-time clinical care involving geographically distant patients and providers can deliver the highest quality care to even the most remote communities. Remote monitoring made possible by broadband can facilitate post-operative care and chronic disease management without hospitalization or institutionalization.

Small pilot projects have produced significant reductions in hospital admissions and the cost of care. A Veterans Administration study of one remote monitoring program showed a 40 percent cut in emergency room visits and a 63 percent reduction in hospital admissions. Penn State University estimated that remote home health monitoring for one group of diabetes patients cut costs for hospital care 69 percent, from almost \$283,000 to approximately \$87,000 per patient. And a study by economist Robert Litan projected that broadband-based monitoring could cut medical costs for senior citizens by about 30 percent.

As Jon Linkous of the American Telemedicine Association observes: “Broadband Internet access to hospitals is becoming a critical tool in the delivery of medical services.”

For example:

- The Alaska Federal Healthcare Access Network (AFHCAN) links more than 248 sites including: military installations; Alaska Native health facilities; regional hospitals; small village clinics; and, state of Alaska public health nursing stations for a range of healthcare services using a variety of high-speed broadband services including satellite.
- The Downstate Illinois Regional Telehealth Program uses T1 lines, DSL, and Cable to develop community-institutional partnerships to strengthen local health care capacity through the use of advanced technologies. They provide medical education and training to 52 rural hospitals through videoconferencing, satellite broadcasts and web streaming.
- The 82-site Missouri Telehealth Network provides services in more than 15 different medical specialties, with a majority of the work coming from radiology, mental health, dermatology and cardiology. To date, more than 11,000 interactive video encounters and 57,500 Teleradiology exams have been conducted. The Missouri Telehealth Network uses T1 (Frame Relay) connections to each site to provide dynamic bandwidth allocation for voice, video and data.

- The University of Arkansas' ANGELS program connects physicians at more than 40 sites with pregnant women in rural communities to improve pre-natal care and reduce the number of low birth weight babies. In 2005, the program's call center received an average of 2,500 calls a month and facilitated more than 400 critical hospital transports.
- The REACH program, initially established by the Medical College of Georgia, puts stroke specialists in touch with rural hospitals and physicians statewide for consultation on key treatment options during the critical three hours after a stroke.

Despite these exciting individual initiatives, telemedicine programs in the United States have barely scratched the surface and large barriers remain before we see meaningful, widespread results. Capital investment in health care IT falls far short of what is needed. Insurance reimbursement, including Medicare and Medicaid, have yet to embrace broadband-based clinical interventions. The broadband networks on which telemedicine depends do not reach enough people, nor are they robust enough to deliver the full benefits in either care or costs.

What's needed now is a *national* commitment to developing telemedicine technologies and strategies – a commitment that builds on the successful individual programs underway at the state and local level to push broadband adoption and also define a national plan for telemedicine. Key to this commitment is the understanding that investment in the continued development and expansion of the U.S. broadband is a fundamental prerequisite for the long-term ability of telemedicine to enhance America's health care system.

As a first step, IIA urges Congress to establish a National Commission on Telemedicine. Within a year, this Commission should design a program that would accelerate the development of telemedicine; provide financial incentives, including supportive insurance reimbursement, for the universal embrace of telemedicine by medical institutions and practitioners; and remove regulatory or statutory barriers to telemedicine programs.

At the same time, the United States also must push ahead with efforts to deliver high-speed broadband to every corner of America – especially to remote communities that lag behind in both high speed Internet access and healthcare. The ability of broadband-powered technology to help deliver better quality and more cost-effective health care is one reason why the Internet Innovation Alliance is working to bring affordable broadband access to every American. We must not delay.

Health Care and the Power of Broadband

As America moves deeper into the 21st century, it has become increasingly evident that improving the healthcare system has climbed near the top of the nation's agenda. The key challenges have been evident for some time – providing access to care for every American, assuring a high quality of care across the system, reducing medical errors, and finding the resources to pay for it. Consensus on a solution has been harder to come by.

For health care, advances in technology have produced great benefits, but they also have contributed to rising costs and contributed to a quality gap between those with health insurance (or personal wealth) and those without. New imaging technologies have enabled earlier and more accurate diagnosis; new machinery, new drugs and a range of implant devices have extended life and enhanced its quality. But these breakthroughs also have raised costs and fueled intense debate about who should have access to the new medical miracles and how to pay for enhanced care.

But about one area of technology there is little debate. The emergence of the Internet and the expansion of broadband service have opened vast new areas of opportunity for better health care and improved cost management. Even as the nation struggles toward comprehensive reform of its health care system, broadband communication holds the power to improve the quality of care, cut costs and reduce the medical service gap among American communities.

Enhanced medical recordkeeping and paperwork management made possible by broadband-linked networks, can reduce waste, improve patient outcomes, and reduce costs. Telemedicine applications that enable real-time clinical care involving geographically distant patients and providers, can bring quality care to remote rural communities, save lives, and reduce dangerous and costly patient transport. And, remote monitoring, possible only because of broadband, reduces hospital admissions and costs by enabling post-operative care and chronic disease management to take place safely at home or as people go about their daily routines.

While no study has yet estimated the total cost savings possible from these broadband-enabled techniques, results from a variety of small programs make clear the potential. A Veterans Administration study of one remote monitoring effort showed a 40 percent cut in emergency room visits, a 63 percent reduction in hospital admissions and a 60 percent reduction in the number of hospitalizations.¹ A Penn State University study of one group of diabetes patients showed¹ estimated hospital costs of \$87,327 for patients monitored through telehome health compared to \$232,872 for patients that received traditional homecare from a visiting nurse.² And, a health care study by economist Robert Litan projected that remote broadband-based monitoring had the potential to cut hospital, drug and out-patients costs by 30 percent.³

While not a cure-all for systemic problems and insurance coverage issues that limits health care access for 40 million or more Americans, the potential health benefit of telemedicine and other initiatives made possible by high-speed Internet connections is yet another powerful argument for national policies that accelerate the availability and adoption of broadband in every part of America.

This paper examines trends in telemedicine and “e-Health”, considers the ways in which broadband is enhancing health care, and details some of the ways build on success to date.

Broadband Delivers Better Health Care – Today and Tomorrow

From every part of the political spectrum and almost every major interest group, America is hearing calls to fix a complex multi-tiered financing system that leaves many in rural and inner-city America without timely access to needed health services. Aside from questions of fairness, the gap in care ultimately leads to increased long-term costs as disadvantaged patients often defer treatment while their health deteriorates. Later intervention typically means greater and more costly care and also places increased burdens on an already strained delivery system.

The health care system is also strained by the aging of the Baby Boom generation, a development that will exacerbate financial pressures. The US Centers for Disease Control has recently predicted (March, 2007) that the cost of care for seniors will add 25% to the nation’s health bill by 2030 unless steps are taken to stem the increase. The elderly consume a disproportionately large percentage of every health dollar -as much as three to five times as much according to CDC - (The State of Aging and Health in America 2007,) and because of longer life spans, they also account for a growing share of the American population.⁴

In 1997, one in eight Americans were elderly (age 65 and over). By 2030, one in five could be elderly. As the Baby Boom generation reaches age 65 (between 2010 and 2030), this trend towards an elderly population explosion poses a variety of challenges to U.S. policy makers. [SOURCE POPULATION RESOURCE CENTER].⁵

What’s more, continued escalation in medical outlays is not being matched by better outcomes. In its landmark 2000 study, *“To Err is Human: Building a Safer Health System”* the Institute of Medicine found that there are as many as 98,000 avoidable deaths in any given year due to medical errors in hospitals.⁶

In the words of one acclaimed report *“Redefining Health Care: Creating Value-Based Competition on Results”* the U.S. Health Care System “is on a dangerous path, with a toxic combination of high costs, uneven quality, frequent errors, and limited access to care.”⁷

Systemic reforms have proven elusive to date, and a comprehensive national overhaul of the health care system may take years more to achieve. But information technology tools, including broadband, are already improving care, expanding access and cutting costs in a variety of locations across America. We know how to use Telemedicine and advanced information technologies to help close the economic and geographical gaps in coverage that routinely separate many rural and inner city poor patients from needed medical services. Today there are literally thousands of successful examples of new communications and IT services being pressed into service for patient care, administration and management, improved service delivery, medical research, and teaching.

At the most basic level, broadband enables enhanced information sharing among medical facilities, practitioners and patients. Broadband linkages mean that individuals’ medical history, test results, and medical images can – with the patients’ permission and privacy safeguards – be made quickly available to health care professionals to guide diagnosis and treatment decisions.

Access to comprehensive records improves care decisions, cuts errors and reduces redundant testing by enabling reliance on previous results.

Broadband also enables patients and caregivers to overcome geographic barriers to care. Indeed, the broadband-supported Internet service has given birth to the emerging field of “telemedicine” to link medical experts to patients and practitioners in remote locales hundreds or even thousands of miles away. New telemedicine applications ranging from remote monitoring of chronic diseases to robotic surgery are delivering new hope and better life quality to patients who would otherwise be beyond the reach of the highest levels of care.

Even as we work for overall reforms, we can accomplish much by taking advantage of broadband to share information and deliver clinical solutions.

Here’s some of what broadband can help us do:

- Enhance quality and decision making by connecting patients and practitioners to information sources about best practices, health care innovation, quality care measures, and data on the effectiveness of medical institutions and practitioners.
- Reduce costs and create efficiency in health care management by streamlining recordkeeping and administration
- Empower patients by improving access to information and enabling them to control their personal health record
- Close the medical care gap between urban and rural America and expand access to care through the use of telemedicine for a range of clinical care programs
- Improve the quality of care for all Americans by linking patients and practitioners to the top specialists in every branch of medicine through real-time Internet consultations
- Reduce medical care costs and improve life quality through remote monitoring that brings more care directly into the home
- Overcome healthcare provider shortages through Internet-based care that connects distant practitioners to communities where local medical resources are in short supply
- Enhance disaster preparedness and recovery with seamless communication that can help medical care givers respond quickly to areas of greatest need.

Connecting Patients and Practitioners to Critical Information

The Internet has become a critical source of information in every realm of American life, but for consumers few areas have drawn as much participation as health care. According to the Pew Internet & American Life Project, 80 percent of American Internet users – or about 113 million American adults -- have turned to the Web for healthcare information. Americans have used

the Web to learn about specific diseases, obtain information about health care providers, or review public data about the effectiveness of medical institutions and protocols.

Although consumers need to learn how to use the data judiciously (Pew says only 15% of users say they always check the source of the information), the Internet has become the “go-to” resource for consumers in their search to healthcare answers.⁸

Users search specific diseases and/or treatments; advice on diet and nutrition; exercise and fitness; information regarding medications; information regarding doctors, hospitals and insurers; alternative treatments and much more.

While simple searches have been available at slower Internet speeds – expanded uses of audio and now video will require many fold increases in the bandwidth available to consumers. Audio “Podcasts”; streaming video for patient care education; and, two-way interactive real time video for physician Tele-homehealth consultations also require many times more bandwidth than provided by dial-up connections or lower speed broadband. Just recently physicians have demonstrated how iPhones may be used to send or view high-quality heart images.⁹ With each new application, high-speed, always-on broadband connections will become increasingly important to maximize the opportunities for enhanced health outcomes.

Practitioners, too, are taking advantage of broadband to learn in real time about the experience the other clinicians at institutions and facilities of all sizes and in all parts of the world.

That is why officials of the National Library of Medicine -- who have led federal government efforts to promote the next generation of Internet services for healthcare -- maintain that timely access to information about best medical practices is fundamental to quality patient care and good outcomes. Managing this information is critical to transforming healthcare so that can patients can make informed decisions; administrators can facilitate the orderly flow of patients through an increasingly complex healthcare system, and clinicians can keep up-to-date about best treatment and practice options on behalf of their patients.

The sheer volume of accumulated healthcare and medical information is daunting. The NLM MEDLINE database contains more than 15 million records from 5,000 selected publications. More than 600,000 peer-reviewed medical journal articles were added in 2006.¹⁰

Moreover, there are millions of clinician consults, and billions of healthcare insurance claims filed annually in the United States.

Information technology can help America meet the challenge. It’s all part of what the *Center for Healthcare Transformation* calls “an Intelligent Health System” that can turn the problem of inadequate outcomes and rising costs into two great 21st century opportunities:

- An Intelligent Health System (that) will improve health outcomes, improve the quality of life, lead to longer lives at lower cost and save individuals, companies and governments billions of dollars.
- An Intelligent Health System (that) will be the greatest single 21st century source of high paying jobs and foreign exchange earnings as people across the world discover they want

the quality of life, the level of health, and the effectiveness of health care which the American Intelligent Health System will make possible.¹¹

Improving Patient Care Administration

Information technology also can help with the dizzying array of paperwork including hand written referrals, prescriptions, authorizations, insurance claim forms, doctors orders and more. The paper blizzard adds up to huge system inefficiencies and needless costs. Researchers have estimated that bureaucracy alone may account for as much as 1/3 of all US health system costs -- an amount that now likely exceeds well over \$300 billion annually.¹²

Patient care administrative information is often inaccurate, redundant, and difficult to share across the system. The results for patients can be disastrous. Among the risks: dangerous treatment delays; inadvertent disclosure of sensitive personal information; patients lost in the system; missing critical information like drug allergies; or, people who (on rare occasion) tragically receive the wrong care because they may have been misidentified.

Part of the answer lies with the secure integration of information technologies across the healthcare enterprise for patient care administration and management.

Broadband computer-based network systems can help provide a range of administrative tools and control of patient care management and medical records

Examples include: online call scheduling for clinicians; online provider resource directories for patients; and sophisticated appointment software for patients and healthcare administrators to better communicate.

Electronic claims submission and processing via high-speed networks is critical given the sheer volume and complexity of today's billing environment. VOIP (voice over Internet Protocol) offers remote rural patients a low-cost way in which to communicate with their provider regarding scheduling, adherence to treatment plans, and follow-up care.

The promise is exemplified by experience at the University of Illinois Chicago Medical Center, where implementation of its electronic record system has produced dramatic improvements for patient care management:

- The number of patients seen without a medical record on hand was reduced by 40 percent, and physicians spent 30 percent less time looking for chart.
- More than 5,000 annual radiologist hours went to patient care, which meant that each radiologist spent about five fewer hours per week reviewing medical records.
- Physicians saved five hours per week reviewing resident orders, because they can be accessed on computers in real time.
- Chart pull requests dropped 75 percent and should decrease more as the providers automates it across the entire enterprise.
- The elimination of 12 paper forms.

- Universal availability of patient records. Before installing the system, patient records were not available about 40 percent of the time when a patient first arrived for care. The records are now available 100 percent of the time.¹³

Better recordkeeping also can improve clinical outcomes. St. Luke's Health System in Kansas City, Missouri reports that digitizing record keeping across its 11-hospital system meant its medical staff had immediate access to patient data, test results, and lab work. St. Luke's credits the advance in information technology with a stunning 38 percent stroke reversal rate, which compares to a national average of four percent. [SOURCE ATT CASE STUDY].¹⁴

Administrators also estimate that establishment of a regional information network that links all health care institutions in the Kansas City area would ultimately save \$13-\$20 million a year.¹⁵

Empowering Patients - The Personal Health Record

Broadband also facilitates better record management by consumers themselves.

In our highly mobile society, healthcare consumers are constantly challenged to find appropriate care when and where it is needed. People move, change jobs, or may face multiple conditions that necessitate a variety of healthcare providers over time. The system is highly diffuse and largely uncoordinated.

And yet patients are increasingly being viewed as an integral part of their own care giving *team* – challenged to work closely with their physicians, allied healthcare professionals and advocates in a collaborative manner.

Under these circumstances, access to accurate and timely patient care data may be crucial to successful outcomes. And yet all of a patient's longitudinal healthcare information is rarely found together in one place – let alone readily available from *any* place when needed.

An Internet-based set of tools known as the Personal Health Record (PHR) offers a forward-looking opportunity to help track and organize this information for ready access by the care giving team.

“Keeping your own personal healthcare record allows you to provide doctors with valuable information that can help improve the quality of care you receive,” according to the American Health Information Management Association. A PHR can help reduce or eliminate duplicate tests and allow you to receive faster, safer treatment and care in an emergency. In short, a PHR helps you play a more active role in your healthcare.”¹⁶

Many companies have produced sophisticated, yet easy to use, PHRs that will help further drive the consumer movement in healthcare. In a bid to cut health costs through better patient outcomes, a number of major U.S. companies are participating in a non-profit venture, called Dossia <http://www.dossia.org/home> to speed the use of PHRs.¹⁷

Telemedicine: Quality Care Courtesy of Broadband

Perhaps the most exciting and far reaching link between broadband and health care is the emerging area of telemedicine – real-time clinical interventions involving caregivers and patients in geographically distant locations. Telemedicine programs include emergency intervention, such as a Georgia program that enables stroke specialists to provide potentially life-saving assistance to victims in remote areas; the transmission of medical images for diagnosis by distant experts; remote in-home monitoring for post-operative care and chronic disease; and even robotic surgery.¹⁸

These clinical programs deliver care to patients in underserved communities, connect patients to specialists at remote locations, cut down on long-distance transport of sick patients, and generally narrow the care gap between communities. As the Alliance for Public Technology summarized in a recent report on broadband:

“Using broadband connections, patients can check their pulse, screen their vision, monitor blood pressure, blood oxygenation, temperature, glucose levels and heart function and send this information in real-time to the medical staff. Patients and providers also can interact online through videoconference activated by touching the appropriate icon. Once connected, a clinician can use a stethophone to expand examination of the patient.” (Alliance for Public Technology. Achieving Universal Broadband: Policies for Stimulating Deployment and Demand)¹⁹

Jon Linkous of the American Telemedicine Association put it this way: “Broadband Internet access to hospitals is becoming a critical tool in the delivery of medical services.”

There are now hundreds of clinical telemedicine programs throughout the nation that rely on broadband connections.

- The Alaska Federal Healthcare Access Network (AFHCAN) is linking more than 248 sites including: military installations; Alaska Native health facilities; regional hospitals; small village clinics; and, state of Alaska public health nursing stations for a range of healthcare services using a variety of high-speed broadband services including satellite.
- In Ware County Georgia, the public health department is using T1 connections over a Wide Area Network to link 16 county health departments in Southeast Georgia to establish critical service links for children with special health care needs.
- The Downstate Illinois Regional Telehealth Program is using T1 lines, DSL, and Cable to develop community-institutional partnerships to strengthen local health care capacity through the use of advanced technologies. They provide medical education and training to 52 rural hospitals – including 32 critical access hospitals – using videoconferencing, satellite broadcasts and web streaming.
- Although still in its infancy, remote robotic surgery has been successfully demonstrated on many occasions including recently at the 86th Annual Congress of the American College of Surgeons, where Johns Hopkins physicians at McCormick Place in Chicago performed a remote-controlled and computer assisted minimally invasive procedure on a patient located in Baltimore.

- The 82 site Missouri Telehealth Network has provided services in more than 15 different medical specialties, with a majority of the work coming from radiology, mental health, dermatology and cardiology. To date, more than 11,000 interactive video encounters and 57,500 Teleradiology exams have been conducted. The Missouri Telehealth Network uses T1 (Frame Relay) connections to each site to provide dynamic bandwidth allocation for voice, video and data.
- Since its inception in 1993, the Eastern Montana Telemedicine Network has conducted 15,728 clinical encounters averaging over 1200 encounters annually. Tele-mental Health services are EMTN's leading medical application. Other clinical applications include specialty areas of cardiology, nephrology, diabetes education, emergency medicine, ENT and radiology. The program uses T1 connections for videoconferencing.
- The Tillamook, Oregon *Lightwave Telehealth Technologies* project is designed to provide broadband service between emergency care providers, the county health department and hospital using a virtual private network to share critical information in support of emergency care services.
- University of South Dakota Health System is using T1 terrestrial lines and Satellite connections to frontier rural areas of the state to provide teleconsultation for high-risk newborns.
- University of Tennessee Health Sciences Center is using Satellite links to provide Telehealth services for diabetic patients in largely Hispanic and underserved frontier communities.
- The University of Arkansas' ANGELS program connects physicians at more than 40 sites with pregnant women in rural communities to improve pre-natal care and reduce the number of low birth weight babies. In 2005, the program's call center received an average of 2,500 calls a month and facilitated more than 400 critical hospital transports.
- Sentara Norfolk General Hospital was the first hospital in the nation to fully deploy and independently test a highly sophisticated remote Intensive Care Unit monitoring system to promote team work on-line, so that expert care may be available 24/7 even when the clinicians are not at the patient's bedside. An elaborate network of cameras, monitors, and two-way communication links, using high-speed T1 lines enables doctors and critical care nurses at the eICU® command center to make virtual rounds of patients.
- The REACH program, initially established by the Medical College of Georgia, puts stroke specialists in touch with rural hospitals and physicians statewide for consultation on key treatment options during the critical three hours after a stroke.
- In concert with the Virginia Tech *Network Virginia* program, the Southwest Virginia Alliance for Telemedicine is using ATM T1 connections at each site to provide clinical consultations for pediatric cardiology, diabetic retinopathy, radiology, and dermatology.

- Now, through the Office of Telemedicine of the University of Virginia Health System, the Alliance has been able to offer connectivity to soldiers deployed in Iraq with family members at home in Virginia through the telemedicine network.

Disease Management

Some of the biggest challenges facing our healthcare system include the ongoing care and treatment of millions of American patients with chronic conditions and diseases including arthritis, asthma, cancer, diabetes, heart disease, and complications of obesity.

A report for the California Health Care Foundation found that use of a particular type of clinical information system known as a *disease registry* can greatly improve care by helping physicians and allied care givers to better identify and then reach out to patients in support of ongoing intervention.

Computers are used to capture and manage information on specific conditions. Reports may be generated internally or – if adequate communications are available – within or across networks. Increasingly, disease registries are being maintained on securely accessed web sites for ease of access.

- Providence Health System, a network of more than 50 medical centers in the Pacific Northwest, maintains an active disease registry reporting system that is fully integrated into its electronic system of health records for more than 300,000 patients.
- The University of Washington Physicians Network has implemented a diabetes management program using registry systems as part of an electronic medical records system.

Other examples cited by CHCF include an Asthma Registry of the Cambridge Health Alliance, the Central Jersey Physician Network, and the Disease Registry of Intermountain Healthcare, and a Diabetes Registry of Sutter Medical Center in Santa Rosa, California.²⁰

Remote Monitoring: Bringing Care Home; Keeping Patients Active

Increasingly, healthcare providers are working with patients to provide disease management services and patient care monitoring directly into patients homes, at alternate care delivery sites, and even during work and play.

Telehomecare has emerged as one of the most important applications of broadband communications. Using two-way audio and/or video consultations into the home Telehealth has been shown to be extremely safe, effective, and convenient for patients, families, and healthcare providers. Remote monitoring of EKG, oxygen levels, vital signs, heart and lung sounds and weight are all now routinely available. Handheld devices allow patients to help manage their chronic diseases through better compliance with treatment plans.

With reliable monitoring, patients can go home sooner after hospitalization and stay home longer before returning to a medical care institution. Always-on broadband monitoring means changes

in vital signs or key disease indicators can be spotted when they happen – not just when a visiting nurse or other health care professional takes a measurement. In essence, monitoring devices mean the patient and caregivers are connected between visits.

And, early empirical evidence suggests that dollar savings are large and medical outcomes are better.

The Pennsylvania Homecare Association has compiled research results from across the nation. In Pennsylvania, homecare agencies including visiting nurse associations, hospices and home health agencies are using more than 2000 telehealth monitors in people's homes. As indicated, a Penn State cost analysis of diabetes patients showed monitored through telehealth visits showed estimated hospital costs of \$87,327 for patients monitored through telehome health, and \$232,872 for patients that only received traditional homecare by a nurse.²¹

A University of Tennessee Medical School Telehomecare Study found that 98 percent of patients were satisfied with telehomecare, and that 100 percent said the equipment was easy to use.²²

A study by the Veterans Administration found that remote monitoring of health conditions could reduce the number of emergency room visits by 40 percent, cut hospital admissions by 63 percent, and reduce the number of days in the hospital by 60 percent.²³

Remote monitoring also boosts the productivity and effectiveness of medical care. In Eddy New York, the visiting nurse service has installed more than 200 patient units in home and uses four central nursing stations to improve nurse productivity by reducing the need for in-person visits. One nurse may monitor more than 100 patients daily. Patient care has improved as hospital and emergency room visits have decreased.²⁴

In a December 2005 study, Economist Robert Litan of the non-profit Kaufman Foundation observed: "Savings from broadband-based remote monitoring for all chronically ill patients are potentially quite remarkable – as much as 30 percent of all hospital, out-patient, and drug expenses."²⁵

Remote monitoring has enormous potential beyond the home. Wireless broadband can enable patients of any age to live fully active lives outside the home – to pursue their careers and leisure interests secure in the knowledge that chronic health issues are under silent observation by various monitoring devices.

For example, new wireless broadband-enabled devices can be implanted in patients' chests to enable remote monitoring of cardiac-related events such as blood pressure changes, heart rate changes and fluid buildup. Physician alerts can be automatically generated, and patient symptoms addressed quickly. A study by Medtronic, which is seeking FDA approval for one such devices showed a 41 percent reduction in hospitalizations in its study group²⁶ The Medical Center of South Carolina is already running a program in which implanted cardiac defibrillators are beaming data back to doctors on a regular basis.

A range of other monitoring devices provide similar support for patients with other chronic ailments. One company is working on a bandage that can take glucose readings without puncturing the skin and relay key readings directly to a care providers office or monitoring

location – bypassing the lab analysis required with a traditional blood test *and* without requiring the patient to even pause whatever they are doing.

Overcoming Healthcare Provider Shortages

Broadband-enabled telemedicine can also help mitigate the impact of shortages and mal-distribution of specialty trained physicians, nurses and allied healthcare professionals – a problem that may grow more acute as the current caregiver population grows older.

For example, the National Rural Health Association notes that by 2010, 40 percent of all registered nurses will be 50 years old or older. It estimates that the United States will need 1.7 million nurses but only 635,000 will be available. The shortages are especially acute in rural and remote frontier areas and many inner-city communities.²⁷

By facilitating remote consultations, telemedicine can effectively expand the capacity of the healthcare system and help fill the gaps that exist in coverage, extending the reach of clinicians into shortage areas.

“First and foremost, Telehealth methodologies by their very nature are designed to address the problem of provider mal-distribution through providing clinical care at a distance in either rural or urban settings.” [Telehealth and Healthcare Provider Shortages Position Statement from the American Telemedicine Association, July 2007] ²⁸

These technologies also can be used to help mentor, train, and provide continuing education to busy healthcare professionals who cannot otherwise take the time from their remotely located practices to travel for education. Using well developed distance education technologies including two-way interactive audio and video, clinicians may now remain in their communities, while keeping current with the latest medical advances, protocols and procedures. Technology also may help address shortages by promoting new models of practice that improve the effectiveness and efficiency of the care process.

Healthcare Transformation - State and Federal Efforts

State and Federal assistance have played a valuable role in the early successes in telemedicine and IT-based health initiatives. Congress has provided hundreds of millions of dollars in grant funding through the Departments of Agriculture, Commerce, and Health and Human Services. State governments have also provided key resources. Thousands of ongoing “e-Health” programs trace their existence to the public-private sector research partnerships that have grown from government initiatives.

Government also has direct patient-care responsibilities for tens of millions of Americans, including military personnel, and is increasingly turning to IT-based solutions to support active duty military and veterans. For example, DoD Health Affairs is working to deploy its AHLTA electronic medical record system worldwide among more than 9 million service members, retirees, and their families. The Veterans Health Administration (VHA) – the largest integrated healthcare system in the world – has been a leader in this area.

Nearly 30,000 veterans are now cared for remotely using Telehome health provided by VHA. Soon nearly 200,000 patients per year will be screened for diabetes and eye conditions using Tele-retinal imaging. The VHA also uses high-speed connections to link up its 21 Polytrauma Rehabilitation Centers for military personnel who have experienced severe injuries, including Post Traumatic Stress Disorder. And its VistA (Veterans Health Information System and Technology Architecture) is the most widely used health information technology system in the world among 193,000 healthcare professionals and millions of veterans in care facilities. The VistA Imaging multimedia on-line patient record (available in most VA Medical Centers) is possible only because of robust broadband connections.

A new Federal Communication Commission Telemedicine pilot program seeks to facilitate the creation of a nationwide broadband network dedicated to health care, connecting public and private non-profit health care providers in rural and urban locations. Building upon existing Universal Service Fund efforts -- the FCC wants to encourage statewide and regional networks to connect government research institutions, academic medical centers, and public and private healthcare organizations that serve as repositories of medical expertise and information. California is seeking \$39 million from the FCC program for a "California Telehealth Network" that would employ broadband to link 319 health care sites throughout the state. Eventually, the state hopes to link every one of California's healthcare providers on a single broadband network.

Policy Adjustments Needed

Continued advances in health-related IT and telemedicine will require adjustments in federal, state and private sector rules and policies to encourage health care providers to fully embrace the opportunities and to lower some key barriers to telemedicine. Broadly, the emerging field faces a host of organizational, financing, regulatory, security, standards, and other related technology issues. In particular, health care practitioners need assurance that telemedicine interventions will be reimbursed by both public and private sector insurance programs.

To start, healthcare organizations must be committed to change, and open to adopting new technology-assisted approaches to improve access to quality and cost-effective services. Institutional policies must reflect a commitment to IT adoption. Patient-care advocates must appreciate how healthcare IT tools may help them achieve the proactive consumer services they seek. And payers -- including public and private sector insurers -- will have to significantly change their policies to account for the value-added benefit that healthcare information technologies bring to both benefits and care management.

Below is some of what is needed from a policy perspective:

- Healthcare IT projects must be adequately capitalized – even when down stream program revenues are merely *projected*. Unfortunately, government healthcare financing agencies (i.e. CMS) are focused on year-to-year budgets and do not acknowledge forecasted "out-year" savings that should accrue from technology investments.
- Financial incentives must be aligned – so that organizations that pay for the technology are the same ones that realize the benefits. Small group practices, clinics, and hospitals

would be more willing to make capitol investments and incur ongoing costs if they knew that eventual system savings would be reflected in their payments.

- Reimbursement systems including Medicare and Medicaid should consider Telemedicine and e-Health provided care as “covered services” -- subject to the same program benefits and rules as other medically provided services.
- Capitol adjustments and tax incentives to encourage equipment purchases should also be enacted. Chronic care and disease management organizations should consider how IT adoption can reduce costs under capitated or managed care payment systems. For their part, healthcare organizations must start building advanced IT purchases into their budgets.
- FDA decisions about whether (and to what extent) Telemedicine and related hardware and software technologies constitute “medical devices” should be designed to encourage the introduction of new technologies that support telemedicine
- The Centers for Medicare & Medicaid Service should modify Stark Law self-referral prohibitions and also “safe harbors” to allow electronic health records and e-prescribing without fear of violating anti-kickback laws.
- To ensure safe, reliable and effective care delivery, the healthcare industry must help “self-regulate” the implementation of healthcare IT through the development and diffusion of new standards.
- Private sector organizations including: the American Healthcare Information Management Association (AHIMA); American Telemedicine Association (ATA); Continua Health Alliance; and, the Healthcare Information Technology Standards Panel (HITSP) are all working to address various aspects of practice guidelines and needed clinical and technical standards.
- Accreditation, certification, and licensure of healthcare facilities and of professionals must be adjusted to address telemedicine. The Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) has established and continues to review its accreditation and certification policies in this area. State-based physician licensure system that has often been viewed as a major impediment to the growth of telemedicine services provided across state-lines and may require adjustment.
- Public policymakers and private institutions also must find ways to protect the confidentiality and security of medical records and individually identifiable health information in an increasingly electronic environment.

In a recent white paper entitled: *Telemedicine, Telehealth, and Health Information Technology*, the American Telemedicine Association put it this way:

“Much is yet to be done. Interoperability has not yet been achieved in the rapidly expanding applications in such areas as home Telehealth and remote monitoring for patients and consumers. Fortunately, recent expansion in the telemedicine market, falling costs in the development of

new technology and the convergence of telemedicine and other HIT applications provides new opportunities to create technical standards.”

ATA also noted: “the telemedicine community also needs to further develop unified protocols and guidelines for both clinical and administrative activities related to remote patient care.”²⁹

The Core Requirement: Broadband for All

But for all of the required policy and regulatory adjustments, telemedicine rides on the back of broadband, and the most critical prerequisite for success will involve spreading high-speed broadband to every corner of America – especially geographically remote communities that tend to lag behind in both Internet access and healthcare. If we succeed, we can resolve two challenges at once. When every American has broadband, every American will have more health care options as well.

In a 2006 paper, Telemedicine pioneer Max Stachura, a physician and Director of the Medical College of Georgia Center for Telehealth, explained it thusly:

“Many aspects of telehealth are dependent on access to high-speed broadband networks, bi-directional transmission speeds, and quality of service that will guarantee stable transmission of video and other health data. Without robust and ubiquitous broadband networks, Telehealth applications lose many of their important functionalities. Broadband network customization is also an important attribute of Telehealth applications.”³⁰

Telemedicine and the ability of broadband-powered technology to help deliver better quality and more cost-effective health care is one more reason why the Internet Innovation Alliance is working to bring affordable broadband access to every American.

With each passing day, the Internet assumes a more significant role in people’s daily lives. Maintaining it, keeping it robust, and expanding it so it can deliver more and better services to more Americans must be a national priority.

IIA does not have the solution to America’s health care crisis. We do not know the best way to deliver insurance coverage to every American or how to give every person in our country access to quality health care. But we do know that broadband can deliver enhanced medical services and that tens of thousands of Americans – many in chronically underserved communities – are already benefiting from better health care because of broadband. If we close America’s digital divide in broadband, we will help close the divide in health care as well.

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³⁰ Max Statura, M.D., “Promoting Telehealth In A Broadband World”, A Paper of the Alliance for Public Technology, June 2006

Improving Health Care: Why a Dose of IT May Be Just What the Doctor Ordered

BY DANIEL CASTRO | OCTOBER 2007

It is time to reinvigorate and renew our national strategy for improving health care through the use of electronic health records and other health IT.

Information technology (IT) is a major driver of innovation and economic growth.¹ Health IT promises to revolutionize health care by improving the quality and containing the costs of care. For the American health care system to benefit from advances in IT, it must adopt electronic health records (EHRs). An EHR² contains the complete medical history of a patient, including a full listing of illnesses, laboratory tests, treatments, drugs administered, and allergies.

Health IT is not just about merely digitizing medical records to create a paperless office, although doing this will achieve considerable savings—it is also about fundamentally transforming the health care system so that both doctors and patients have access to information and tools that allow them to better manage their care. This new IT-enabled model of health care has the potential to improve preventive health care and chronic disease management and reward medical practices with financial incentives for effective and efficient care. It has the potential to give health care researchers the data they need to identify and deliver best practice care and continuously improve the quality of health care. Finally, health IT has the potential to empower consumers to better understand and manage their own health care conditions, needs, and treatments.

Recognizing the importance of IT to health care, President Bush issued an executive order in 2004 calling for the rapid deployment of a nationwide interoperable health information technology network, including EHRs for all Americans, within 10 years. The U.S. Department of Health and Human Services (HHS) has led this effort. Unfortunately, the results of the national health information network initiative to date have been disappointing. So far, for example, HHS has not established comprehensive standards for the network.

The strategy of building the network from the bottom up by establishing many regional health information organizations (RHIOs) throughout the country is not working. More than 100 RHIOs have been established across the country, but the majority are financially unus-

tainable.³ In the absence of clear national standards for sharing medical data, achieving system interoperability for RHIOs has been difficult.

Many medical practices are choosing to wait on the sidelines until national standards for EHRs emerge. Moreover, in part because most of the benefits of health IT accrue largely to parties other than health care providers, there is no convincing value proposition to encourage providers to make long-term investments in EHRs. In addition, medical privacy advocates have objected to efforts to move to EHRs, because they are concerned that existing privacy protections for patients are insufficient.

It is time to reinvigorate and renew our national strategy for improving health care through the use of EHRs and other health IT. Although the private sector will continue to engage in a number of projects to bring about change, the federal government also has an important role. Now is the time for action, and Congress should commit to a new strategy.

To help accelerate the transformation to an IT-enabled health care system, we propose that Congress take the following steps:

- **Pass legislation to promote the use of electronic health records and national health data standards.**
- **Create a legal framework for health record data banks.**
- **Leverage federal resources to ensure access to health record data banks.**
- **Require medical practices to disclose patient health information electronically upon request.**

HEALTH CARE IN AMERICA

The American health care system has some of the world's best doctors, hospitals, and medical research facilities, and there is no question that top quality medical care is available to those who can afford it. Nevertheless, our health care system also has many problems, including costly and inefficient health care, improper or inadequate care, inequitable access to care, and difficulty obtaining complete medical records.

With health expenditures of \$2.0 trillion per year,⁴ the United States spends more on health care than any other nation.⁵ Sixteen percent of our gross domestic product is spent on health care, translating to approximately \$6,697 per capita. Yet for all this spending, in 2000, the World Health Organization ranked the health care system in the United States as 37th in overall performance.⁶

Many factors contribute to our low ranking in health care. Unhealthy lifestyle choices such as poor diet, physical inactivity, and carrying excess weight contribute to the high cost of health care and morbidity rates. Currently, for example, nearly two-thirds of all U.S. adults are overweight.⁷ One study estimates that reducing obesity rates could generate productivity gains of \$254 billion and save \$60 billion in direct health care spending.⁸ Another problem is that many people do not have access to affordable health care. Almost 47 million Americans, or 16 percent of the U.S. population, do not have medical insurance.⁹

Quality of care issues also plague our current health care system. Some individuals do not receive the proper amount of care.¹⁰ Those who receive too much care or the wrong kind of care waste resources, while those who receive insufficient care may develop additional health problems. In many instances, the health care that people receive is not based on the best available scientific evidence. A study in 2007 found that children receive the recommended care less than half the time.¹¹ A related problem is patient safety.¹² In 1999, a study by the Institute of Medicine estimated that between 44,000 to 98,000 people die every year as a result of medical errors.¹³ This statistic has since been disputed,^{14,15} but there is little question that more progress is needed to improve patient safety.¹⁶

Furthermore, many individuals with chronic illnesses do not receive adequate or proper care in the current health care system. Chronic conditions are those that “last a year or longer, limit what one can do, and/or may require ongoing medical care.”¹⁷ More than 125 million Americans have a chronic illness and more than 88 percent of the population aged 65 years and older has at least one chronic condition.¹⁸ As the population ages, this number will continue to rise. Care

for chronic conditions differs substantially from care for acute illnesses or infectious diseases. Furthermore, chronic conditions are the leading cause of death and disability, accounting for 70 percent of all deaths in the United States.¹⁹ Poorly managed chronic illnesses such as cancer, heart disease, or diabetes lead to unnecessary suffering on the part of patients, as well as to inefficient uses of the health care system. Approximately 75 percent of all U.S. health care spending is for the treatment of chronic conditions.

Access to medical record information is also problematic under the current health care system. Many Americans see multiple health care providers—the average Medicare beneficiary, for example, sees seven different physicians each year²⁰—and their health care records are fragmented. The fact that consumers do not have a single, consolidated health care record makes it difficult for patients to participate in managing their own health care. It also means that many health care providers have incomplete information when they treat their patients. For health care providers, this lack of information sometimes results in medical errors. Incomplete patient information about allergies or other drug usage, for example, sometimes results in medication errors.²¹

Finally, the practice of medicine is still based in part on expert judgment rather than on evidence-based medicine. It is often difficult for doctors to know what the best standard of treatment is, particularly as new research comes forward. Moreover, the lack of data on treatment results makes it difficult for providers to determine which treatments deliver the best results and are most cost-effective.²²

BENEFITS OF HEALTH IT

Information technology (IT) has transformed industries such as finance, retail, and telecommunications by enabling greater efficiency, better performance, and more consumer choice. Unfortunately, the potential benefits of IT have yet to be realized in the U.S. health care sector. Health care providers have lagged in their adoption of electronic health records (EHRs) and other health IT, even though many studies have demonstrated that health IT offers societal benefits such as increases in efficiency and health care quality. Furthermore, the lack of interoperability between EHR

databases has minimized the potential benefits of IT for early adopters of the technology.

One area where the health care industry has successfully implemented IT is in electronic claims processing. Currently, the majority of medical practices use IT for electronic claims processing. Title II of the Health Insurance Portability and Accountability Act (HIPAA) required the U.S. Department of Health and Human Services (HHS) to establish national standards for transmitting electronic health care data and national identifiers for providers, health plans, and employers. The successful transition from paper-based claims processing to electronic claims processing illustrates the potential for improving other health care business processes. A survey in 2006 found that 75 percent of claims were received electronically, compared with 44 percent in 2002.²³ Electronic claims processing resulted in greater efficiency and lower costs. Health insurance plans processed 98 percent of claims within 30 days in 2006, up from 94 percent in 2002.²⁴ The average cost to process a “clean claim” received on paper is \$1.58 versus only \$0.85 for a comparable electronic claim.²⁵

Researchers estimate, for example, that the annual savings from health IT could average almost \$81 billion over 15 years.

Unfortunately, the medical community has not implemented EHRs at anywhere near the same pace as it has implemented electronic claims processing. Estimates show that only 25 percent of doctors use some form of EHRs, but less than 10 percent of doctors use a “‘fully operational’ system that ‘collects patient information, displays test results, allows providers to enter medical orders and prescriptions, and helps doctors make treatment decisions.’”²⁶ There are no reliable estimates on the adoption rates of EHRs in hospitals, but some researchers estimate that only 5 percent of hospitals have fully implemented a computerized physician order entry system, a key tool used to improve patient safety.²⁷

Although EHRs are by no means universal, a growing body of evidence summarized below shows that interoperable EHRs and other health IT will reduce health care costs, improve the quality of care, and give

consumers more access to their personal health information and more control over their treatment options.

Reduced Medical Costs

One reason EHRs and other health IT initiatives have received widespread bipartisan support is that they promise to reduce future U.S. health care costs. Estimates of the societal cost savings vary, but most studies show the benefits of implementing health IT greatly exceed the costs. RAND researchers estimate, for example, that the annual savings from health IT could average almost \$81 billion over 15 years.²⁸ Other researchers have estimated national savings of \$78 billion per year.²⁹

Much of the estimated national savings comes from increases in efficiency such as shorter hospital stays because of better coordination, better productivity for nurses, and more efficient drug utilization.³⁰ In addition, EHRs provide doctors with more complete information about their patients, which reduces the need for duplicative and unnecessary medical tests. RAND predicts that implementation of EHRs by all medical practices would cost approximately \$8 billion per year over 15 years. Thus, the rewards from investing in EHRs would far outweigh the costs.

Investments in health IT such as clinical decision support systems (CDSS) also have the potential to improve care and reduce costs by increasing patient safety. CDSS, which include automated diagnostic programs, computerized test result interpretations, and drug management systems,³¹ provide health care workers with real-time information to aid with treatment and reduce medical errors. EHRs feed CDSS the medical data they need to deliver timely and accurate results. Thus, for example, an EHR could provide a comprehensive record of a patient's allergies and medications history, which a CDSS could then analyze to detect known problems, thereby reducing harmful and costly medical errors. Adverse drug events account for 19 percent of injuries in hospitalized patients in the United States and cost hospitals alone over \$2 billion per year, not including malpractice costs or the costs of injuries to patients.³² One study found that health IT could eliminate around 200,000 adverse drug events at a national savings of \$1 billion annually.³³

In addition to using EHRs and CDSS to improve patient safety, hospitals can use health IT in the form of operational decision support systems to analyze clinical and financial information. Operational decision support systems can be used, for example, to evaluate resource utilization levels, component costs, and clinician performance.³⁴ Operational decision support systems that support administrative decisionmaking can help to ensure higher levels of efficiency and improved business processes.³⁵ Hospitals and other health care providers can use health IT to increase operational efficiency. Some hospitals, for example, have implemented self-service kiosks for patient registration and providing copayments, thereby reducing patient wait times and decreasing staff utilization.³⁶ Similarly, hospitals that use telemedicine for patients with chronic diseases generated significant cost savings.³⁷ This type of automation also generates substantial monetary and time savings for patients, who benefit from more efficient health care encounters.

Improved Medical Care

EHRs are a prerequisite to using health IT to improve health care. EHRs ensure that medical data are available, organized, and legible. They also provide health care providers with real-time access to their patients' health records. Moreover, EHRs can help improve medical care by making it easier for doctors to provide evidence-based medicine. Evidence-based medicine is the use of treatments deemed to be the best practice for a certain population, based on the evidence of expected benefits and risks. Without sufficient data, health care providers lack the knowledge necessary to effectively apply evidence-based medicine.³⁸ CDSS use information from EHRs to help doctors improve medical care by increasing patient safety.

The spread of EHRs is a classic example of a network effect, where the value of a product to one individual depends on the number of customers already using that product. Health care providers, researchers, and consumers will reap the greatest benefits from EHRs once EHRs have been widely adopted. At that point, EHRs will improve the quality and quantity of information available to medical researchers and public health officials. In addition, health care providers will be able to use rapid learning systems to develop new

clinical evidence from the data in EHRs, which can then be applied immediately to improve medical care. Physicians will be able to spot dangerous drugs and problems such as those that emerged with Vioxx more quickly.³⁹ EHRs will also yield information that can help in evaluating the effectiveness of various treatment protocols, especially for specific patient populations. Health care providers will be able to use this information to improve evidence-based medicine available to all patients. Public health officials will be able to use information from EHRs to identify possible outbreaks of infectious diseases and monitor treatment efforts.

The goal of these applications is to give consumers the tools they need to manage their health information online as easily as they can manage their finances.

EHRs also promise to help improve Americans' health by providing opportunities for improved approaches to disease prevention and chronic disease management. Health care providers and health plan issuers can use factors identified in patients' EHRs to automatically target specific high-risk patients for disease prevention programs. Thus, for example, a health care provider might automatically e-mail educational material on nutrition to any patients who become overweight. Alternatively, a health care provider might wish to automatically alert a set of patients identified using factors in their EHRs about the availability of new preventive services, such as vaccinations and screenings.⁴⁰ In addition, EHRs can allow doctors to easily and efficiently inform their patients of new medical research as it becomes available.

EHRs can also make it easier for patients with chronic conditions to take an active role in their health care and routinely monitor their symptoms and treatment. One reason that some individuals are not more actively involved in managing their own health care is that they have bought into the idea of the doctor as the expert where "the doctor knows best." EHRs, specifically when coupled with secure web portals, help give patients a stronger sense that they have control of and responsibility for their own care. Certain EHR appli-

cations allow patients to track health markers such as their blood pressure, cholesterol, and body mass index to see how it changes over time and how they compare to "healthy" levels. Thus, patients can use medical home monitoring devices to track and compare their health between office visits.

Health care providers can also use EHRs to improve care to patients with chronic diseases by offering services such as remote vital-sign monitoring, automated appointment scheduling, and medication reminders. By combining continuous monitoring with remote health monitoring, health care providers can identify potential problems and recommend preventive treatment. Medtronic, for example, currently produces a number of implantable cardiac resynchronization therapy and defibrillator (CRT-D) devices that support remote monitoring.⁴¹ Using a wireless data reader that connects to standard telephones, patients can securely transmit the medical data recorded by these medical devices to their health care provider. Their physicians can then review the patients' health information remotely, thereby reducing the number of office check-ups. Remote monitoring also gives patients more flexibility to travel because their physicians can access their health information when they are away from home.

New applications of remote monitoring will likely build on existing devices that provide continuous health monitoring. Currently, for example, there are several devices on the market that permit continuous monitoring of glucose levels in patients with diabetes. The traditional approach to monitoring blood glucose levels, using finger sticks, provides only a few data points. Continuous monitoring allows diabetic patients and doctors to track the patients' glycemic patterns over time and also helps patients better understand the effect of certain behaviors on their glucose level.⁴²

Increased Patient Access to Personal Health Information

Unlike paper medical records which most patients never see, EHRs provide individuals with ready access to their personal health information. Comprehensive EHRs reduce paperwork and enable patients to view a consolidated record of their entire medical history, including health information from different sources. With information in electronic form, consumers can

access their critical medical information even in emergencies such as natural disasters or illnesses while traveling. Because they can easily access their EHRs, they can review them for accuracy and take steps to correct errors.

Many Americans have multiple doctors, each with his or her own specialty.⁴³ Interoperable EHRs ensure that when patients see a new doctor, they can provide their full medical history to that physician. The ability to supply such information will also help individuals with employer-provided health insurance who must switch doctors when they change jobs. The average American worker will have held 10 jobs between the ages of 18 and 40.⁴⁴

The health care industry can potentially use EHRs to provide consumers more detailed information on the cost and effectiveness of various treatments. These data will allow consumers to make better judgments on the value of their treatment options and reward quality care. Patients can use better data on infection rates and complication rates, for example, to make more informed decisions about their own health care treatments. Some people, such as Andrew L. Stern, president of the Service Employees International Union, have expressed doubts that the average American has the capacity and interest to analyze this information,⁴⁵ but such doubts are not supported by the facts.

A survey in 2005 found that 80 percent of Internet users have looked for health information online.⁴⁶ In addition, many online applications, including WebMD, Revolution Health, and Microsoft HealthVault, have emerged to allow consumers to track and analyze their personal health information. The goal of these applications is to give consumers the tools they need to manage their health information online as easily as they can manage their finances. Thus, for example, secure web portals will allow consumers to book their doctors' appointments online, make copayments, get insurance reimbursements, and get their prescriptions filled. Consumer demand for EHRs is growing, and many people have embraced the technology when it is available. One of the leading EHR software companies reports that its product is used by more than 58 million people, mostly in large multi-specialty practices.⁴⁷

One of the nation's leading EHR systems has been implemented by Kaiser Permanente, the nation's largest not-for-profit health plan. This system, called KP HealthConnect, allows patients and providers instant access to their medical information. Physicians use the system to place orders, review laboratory results, and access their patients' medical histories. Health plan members access the information using a secure web portal that allows them to review laboratory results and office visits, as well as to communicate with their providers. As of mid-2007, 1.4 million Kaiser Permanente members had signed up for online access.⁴⁸ One study found that after introducing EHRs, Kaiser Permanente reduced visits to primary and specialist outpatient care by 5 to 9 percent.⁴⁹ Another study found that annual adult primary care visits decreased between 7 to 10 percent among patients who communicated with their providers electronically.⁵⁰ Kaiser Permanente intends to deploy additional functionality to the web portal in the future to allow health plan members to make copayments and schedule their appointments online.⁵¹

Kaiser Permanente serves a dual role as health care provider and insurer that gives it a stronger incentive to invest in health IT than some other entities and allows it more easily to implement and benefit from IT investments than some other entities. Nevertheless, KP HealthConnect demonstrates the potential for EHRs to improve health care for both consumers and health care providers.

OBSTACLES TO HEALTH IT ADOPTION

Given all of the potential benefits of EHRs and other health IT, it is perhaps surprising that the rates of EHR adoption and use in the United States are not higher. Three major obstacles have delayed the widespread adoption of EHRs: the asymmetrical relationship between the costs and benefits of adopting EHRs, the absence of a national standard and consensus for interoperability requirements, and concerns about the security and privacy of personal health information. Fortunately, all of these major obstacles can be addressed through improved federal policies.

Asymmetry of Costs and Benefits Associated with EHRs

The asymmetrical relationship between the costs and benefits of adopting EHRs, coupled with the general lack of competition in the health care marketplace, has reduced the incentive for health care providers to invest in the needed IT systems. A 2006 survey found that 94 percent of hospitals considered the initial cost of EHR adoption as a “significant barrier or somewhat of a barrier.” In addition, hospitals reported ongoing cost as the second greatest barrier to health IT adoption.⁵² From the standpoint of medical practices, especially solo or small group practices where more than two-thirds of U.S. physicians work, cost is an even bigger issue.

Although the net social benefit of investing in EHRs is positive, the return on investment for individual medical practices is less certain. One of the biggest problems is that medical practices incur most of the costs of adopting EHRs, but health insurers and patients receive most of the benefits. One industry observer estimates that medical practices “bear 80 percent or more of cost and cultural change burden, but payers get 80 percent or more of the savings.”⁵³ Another estimate is that physicians receive only 11 percent of the financial savings, with the rest going to “insurers, laboratories, and patients.”⁵⁴ This asymmetry of risk and reward makes it difficult for many medical practices to justify an investment in EHRs, where they are slow to reap the benefits.

Solo and small group medical practices have been slower to adopt EHRs than large practices. Adopting EHRs requires a substantial initial expenditure for equipment, software, installation, and training. One study found the average cost of initially implementing EHRs was approximately \$33,000 per physician.⁵⁵ Medical practices paid on average an additional \$1,500 per month per physician for maintenance costs.⁵⁶ Often these capital expenses come directly from the physician’s take-home pay, because most practices do not have retained earnings to cover these types of expenses.⁵⁷ Apart from bearing such costs, medical practices must integrate EHRs into their workflow so they can benefit from the technology. The process of adapting workflow is often difficult. Some health care workers resist using the new technology, and productivity can suffer during the transition period. One study found

that physicians lost 10 to 15 percent productivity for the first few months after implementing EHRs.⁵⁸ Even with such costs, one study found that the average medical practice generated enough benefits from adopting EHRs to pay for its investment after 2½ years.⁵⁹ On the other hand, some practices did not fare nearly as well.

For solo and small medical practices in particular, investing in EHRs is a risky proposition, because such practices face the possibility that the benefits of adoption will not cover the cost of implementation or that the initial costs will jeopardize the practice’s financial solvency. Many medical practices lack managers with the skills and experience necessary to make strategic investments in health care IT. One study found that the costs involved with deploying EHRs was heavily influenced by the negotiating and technical skills of the employee charged with implementing EHRs, typically a physician or office manager.⁶⁰ Similarly, the amount of benefits accrued by an office after adopting EHRs depended on the business and technical skills of that same employee.

Many early initiatives by hospitals reflected a naïve vision of how IT should be integrated into their workflow processes. In many cases, hospitals began developing IT systems without defining clear strategic goals and metrics for measuring performance.⁶¹ IT systems are not simply “plug-and-play” products and hospitals must consider the extensive training, support and workflow process development that need to accompany these investments.⁶² As a result, hospitals have wasted millions of dollars on health IT systems that failed to generate cost-saving benefits. The Cedars-Sinai Medical Center, for example, spent \$34 million to develop its own in-house computerized physician order entry system that ultimately had to be shelved after a few months of use because clinicians found it to be too cumbersome.⁶³

The average cost per physician of adopting EHRs is higher for solo and small practices than for large practices. Larger practices can reduce the average cost of expenditures for hardware, software, and training by spreading them across multiple doctors. Similarly, hospitals have the potential to achieve greater benefits from EHRs by taking advantage of economies of scale.

Unfortunately, with two-thirds of U.S. physicians working in solo or small group practices, the barriers to the adoption of EHRs for small group practices are a major impediment to the transformation to an IT-enabled health care system.⁶⁴ Eventually, some of the smaller medical practices may consolidate into larger practices to take advantage of the cost savings.

Lack of National Interoperability Standards

The absence of national standards for interoperability and the exchange of health information has hindered the development of a national health information network. Interoperability is necessary for medical data to be exchanged between health care systems. Medical information must be shared between multiple entities including hospitals, clinics, laboratories, pharmacies, insurers, and patients. The development of standards such as HTML for web pages and SMTP for e-mail, for example, facilitated the growth of the Internet. These standards run at the application layer of the computer, so they can work on any operating system or hardware. The same level of standardization is needed to allow interoperability and the exchange of health information.

Medical data is complex and requires precision. Health records must use a standard health vocabulary to ensure consistency and interoperability. National standards for record structures, data formats, and protocols used to exchange information are a critical prerequisite to the development of interoperable EHRs. Various standards development organizations have emerged to classify and organize health information, but national standards have yet to emerge.⁶⁵

Currently, many individuals' medical records are fragmented into multiple, disparate systems. Thus, for example, a patient's lab reports may be stored in one system, diagnostic images in another, and observation notes in a paper file. Interoperability standards that allow the exchange of health information will give patients and their health care providers better access to such information. It will also enable patients to transfer their medical data to a new doctor or share their information with all of their health care providers. In addition to making sure that new systems comply with health IT standards, it will be essential to ensure that

proprietary legacy applications are updated to support interoperability.⁶⁶

Few economic incentives exist to promote interoperability. The benefits of interoperability are spread over many stakeholders in the U.S. health care system. The adoption and implementation of standards-based, integrated, and interoperable EHR systems, for example, has the potential to benefit society by facilitating public health monitoring and medical studies.⁶⁷ Despite such benefits, some health IT companies are reluctant to adopt open standards, because they rely on the lack of interoperability to retain customers. In addition, as a result of the network effects of interoperability, there are first-mover disadvantages with respect to adopting interoperable data standards.⁶⁸ In fact, 79 percent of hospitals reported that interoperability issues with current systems are a "significant barrier or somewhat of a barrier" to health IT adoption.⁶⁹

Fears About the Privacy and Security of Personal Health Information

Many medical privacy advocates object to implementing EHRs because they have concerns about the security and privacy of personal health information. Health care providers own and manage the medical records they create, so patients expect their providers to enact appropriate safeguards to protect the privacy of their personal health information. Current polls indicate that 70 percent of U.S. adults "are generally satisfied with the way doctors and hospitals handle personal health information in terms of protecting its confidentiality and security."⁷⁰ Similarly, a majority of people believe that the increased use of EHRs can be accomplished without harming patient privacy.

On the other hand, approximately one-quarter of U.S. adults do not believe that the move to increased use of EHRs can occur without tradeoffs in privacy.⁷¹ The belief that EHRs may compromise patient privacy is in part a perceptual issue, as studies have shown that EHRs are as secure, if not more secure, than paper-based records.⁷²

Many medical privacy advocates have indicated that they will continue to resist the adoption of EHRs until Congress strengthens medical privacy rights for pa-

tients and restrictions on the use of medical data by health care providers. As noted earlier, the Health Insurance Portability and Accountability Act (HIPAA) required HHS to establish national standards for transmitting electronic health care data and national identifiers for providers, health plans, and employers. The HIPAA privacy rule sets a federal minimum standard of medical privacy for personal health information. Under this rule, patients have the right to access their medical records, to dispute inaccuracies in their medical records and note any disagreements, and to request a disclosure accounting of who has accessed their records. The HIPAA privacy rule also imposes a number of restrictions on health care providers. One is that health care providers give patients notice of their privacy practices. Another is that health care providers train employees and implement data safeguards to protect private medical information. HIPAA sets additional limits on the use and disclosure of health information. Finally, it creates both civil and criminal penalties for violations of a patient's privacy.

The adoption of a federal privacy standard that preempted complex and competing state regulations would ensure all Americans had equal protection for their health information.

The enactment of HIPAA marked a major step forward in protecting the privacy of personal health information, but some medical privacy and patient advocates believe that HIPAA law and regulations did not go far enough. They note, for example, that the HIPAA privacy rule does not apply to certain entities that may have personal health information. The rule does not apply to health care providers who do not submit electronic insurance claims, a shrinking percentage of providers. The rule may not apply to other entities that have access to health information, including certain group health plans, employers, and insurers.⁷³ The rule also does not apply to many web-based health services, such as web sites providing information about health conditions and treatments, online mental health counseling sites, and web sites selling nonprescription drugs.⁷⁴ Such web sites are opt-in services, though, and consumers can make decisions about whether to use

these products based on the web sites' stated privacy policies.

In addition, some medical privacy and patient advocates object to HIPAA's language authorizing entities to use and disclose "protected health information for treatment, payment, and health care operations."⁷⁵ They believe that there should be more restrictive language that would require the patient's consent for the disclosure of information. Some privacy advocates also object to the fact that HIPAA allows health care providers, under certain conditions, to disclose private medical information for public health and research purposes without the patient's consent. Some advocates even object to researchers sharing such information when the data are stripped of personally identifiable information.

Policymakers should recognize that such objections are not objections to EHRs per se but to existing regulations governing the privacy of health records generally. Medical privacy and patient advocates want to increase patients' control over the disclosure and use of their personal health information regardless of what form the information is in. Still, federal privacy regulations do influence efforts to develop an interoperable national health information network. The HIPAA privacy rule establishes a national baseline for a medical privacy right, but states can impose additional restrictions to ensure the privacy of health records. This situation has led to a patchwork of differing state policies, which makes building a national health information network difficult. Currently, for example, health information systems must be customized to meet the privacy requirements of each state.⁷⁶ The lack of uniformity in state requirements reduces the interstate portability of EHRs.

The adoption of a federal privacy standard that preempted complex and competing state regulations would ensure all Americans had equal protection for their health information. It would also ensure interstate portability of EHRs. One additional way to address privacy concerns might be to strengthen laws that prevent discrimination on the basis of personal health information. Such laws could help ensure that privacy risks remain low and concerns about privacy

do not impede the progress of health IT and its life-saving and cost-saving benefits.

WHY A NEW FEDERAL DIRECTION IS NEEDED

Most people agree on the goal of creating a national health information network in which all Americans have EHRs by 2014, but progress toward this goal has been slow. Thus, a new strategy to develop an IT-enabled national health information network is needed. As discussed below, the three competing models for the proposed network are (1) a distributed health information system, (2) a centralized health information system, and (3) a hybrid known as health record data banks (or independent health record trusts).^{77, 78}

Distributed Health Information Systems

One model for an IT-enabled national health information system is a distributed, peer-to-peer model. In a distributed health information system, no data provider maintains a complete medical record of any patient. Each data provider—hospital, clinic, laboratory, or insurer—maintains its own database of health information. Thus, each provider must be able to interface with every other provider to exchange information. Patients and providers use a single user interface to access information from each data source and to construct a virtual health record.

Many proponents of RHIOs advocated a distributed network topology. The Markle Foundation, for example, recommended building a national health information network incrementally by developing a non-proprietary, interoperable, standards-based “network of networks.”⁷⁹ The idea was that there would be no national health ID or a central repository for patient medical records; rather the national health information network would be a distributed system that would facilitate the identification and exchange of patient health information, with appropriate authorization, in a private and secure way. RHIOs were supposed to lay the foundation for a national health information network by allowing communities to develop their own interoperable health networks and EHRs. Unfortunately, as discussed below, the strategy of building the network from the bottom up by establishing many RHIOs throughout the country is not working.

One drawback of a distributed health information system is that such a system can be technically difficult to build and manage. One major technical challenge, for example, is searching for data from multiple, heterogeneous databases. A distributed health information system requires the extensive use of middleware—that is, software used to interface between incompatible databases and data formats. Another technical challenge in a distributed system is identifying patients correctly. If there are two John Q. Smiths living in the same region, for example, a computer system may have a difficult time matching records; similarly it may have trouble verifying that the records for John Smith and John Q. Smith belong to the same person. A record locator service must be used to ensure patient records are correctly matched from each database. Yet another technical challenge is to ensure that each data provider’s database provides an acceptable response time. In addition, developers must work with data providers to ensure a harmonious data retention policy.

In recent years, coalitions of hospitals, insurers, vendors, and nonprofits have sponsored and made valiant efforts to develop RHIOs. Despite this enthusiasm, few RHIOs have succeeded in establishing a sustainable business model. More than 100 RHIO initiatives have begun in the United States, but most rely on seed funding and support from grants. One study found that only seven RHIOs were considered “operational,”⁸⁰ and another study found only two RHIOs were self-sustaining.⁸¹

The failure and lack of sustainability of RHIOs suggest that HHS is not on track to meet the goal of having a national health information network established by 2014. Thus, it is important to understand the technical and other challenges that led to the setbacks and failures experienced by RHIOs built using this model and to adopt a new national strategy that can overcome these challenges.

One of the more prominent RHIOs that failed was the Santa Barbara County Care Data Exchange, which eventually served as a model for many RHIOs across the country. The Santa Barbara project, which was begun in 1998, was proposed and designed by David Brailer, CEO of CareScience, who later became the

first National Coordinator for Health Information Technology at HHS. The Santa Barbara County Care Data Exchange was intended to be a secure regional network for electronically sharing health care data among hospitals, physicians, and other providers at the point of care. In 2006, after a number of setbacks, including Brailer's departure from the project in 2002, the board decided the project was unsustainable and voted to shut it down.⁸² The project ceased operations on December 31, 2006.

Observers have attributed the collapse of the Santa Barbara County Care Data Exchange to a number of factors, including poor project management, software issues, and the lack of a compelling business case. In its initial proposal, CareScience, the company chosen to run the program management office, stated that existing commercial off-the-shelf products could deliver all of the needed functionality. After the project began, though, CareScience found that existing software was insufficient to enable interoperability between legacy health information systems.⁸³ As a result, CareScience took on the role of software developer. This move limited independent project oversight, because that company also operated the program management office. Furthermore, Brailer criticized the project management (including himself) for focusing on delivering the latest technology rather than on addressing users' needs.⁸⁴

The Santa Barbara project also failed to establish a business model that appealed to the providers. Although nobody questioned the net societal value of establishing a health information exchange, the lack of a convincing value proposition for providers made many participants passive, unenthusiastic, and little invested in the project's success. Critics have blamed this result on the easy access to grant money, which enticed health care providers to participate regardless of their interest level and tolerance for risk. When the grant money ran out, these providers were unwilling to continue the project on their own given the uncertain economic benefits.⁸⁵

To be fair, the Santa Barbara County Care Data Exchange provided many useful lessons to the health care community, and Brailer has defended the effort as a

constructive experiment.⁸⁶ Unfortunately, though, it is hard to see how the lessons learned from the Santa Barbara project have been applied to the national health IT policy. The federal effort to building a national health information network continues to focus on a bottom-up approach in an attempt to allow community control. One problem is that consumers are unable to influence these regional projects through traditional market forces. Although RHIOs are developed at the community level, RHIOs are by definition regional, so they have very little competition, and consumers have few alternatives if they dislike the quality of service offered by the RHIO. Moreover, federal policy has not sufficiently addressed the three main failures of RHIOs: the lack of a convincing value proposition, the technical difficulties of searching for data from multiple, heterogeneous databases, and the lack of portability for health information when consumers move outside the system and have to join a different RHIO.

Centralized Health Information Systems

In a centralized health information system, all data on a particular patient are stored in a single centralized database. Technically, this model is simpler to develop than a distributed model. Health care providers populate the central database with their patients' medical data, and developers need to create just a single interface for this database. Many medical privacy and patient advocates oppose centralized health information systems, because patients have little control over who manages their personal health information. Many also object to health information networks with a single centralized system that patients are forced to use.

A centralized health information system works well in a single-payer health care system like the United Kingdom because ultimately all of the health care expense data will be transmitted to a single entity. One of the few successful RHIOs, the Indiana Network for Patient Care, built its system using a centralized database that includes information from five major hospital systems, the county and state public health departments, and Indiana Medicaid and RxHub. Data streams from these health care data providers are transmitted in HL7 to one central system, which is then standardized and linked to a specific patient ID.⁸⁷ The Com-

community Health Management Information Systems and Community Health Information Networks, popular in the 1990s, used a centralized model with a single data network and a single data repository.⁸⁸ Most of these efforts failed for a variety of reasons, including a lack of cooperation between health care providers. In a centralized model, providers fund the information network by charging participants for transactions. Many providers invested in their own information networks but were hesitant to participate in community databases for fear of losing their competitive advantage. As a result, they failed to develop a central database, so the funding models for these projects never materialized.⁸⁹

Health Record Data Banks

The health record data bank model has recently emerged as an alternative to the distributed and centralized health information system models. In this model, multiple data banks compete to manage the EHRs of individual patients. Patients or health insurers pay health record data banks a fee to manage their electronic health information. Each patient's data is stored in a single repository maintained by the health record data bank of the patient's choosing. Patients access their EHRs through a user interface designed by their particular data bank.

Whereas the centralized model forces patients to use a single database, the data bank model gives patients a choice of data bank providers. Providers of health record data banks could conceivably include membership groups like AARP, health care providers, employers, health plans, or other trusted entities such as companies that emerge with specialized health care web portals.⁹⁰

In the data bank model, all of a given patient's data is stored in a single bank's repository. Thus, the health record data bank's architecture eliminates many of the technical problems of compiling a virtual EHR for a patient from multiple databases in a distributed system. In a distributed system, to assemble a complete EHR for a single patient, every database that contains a piece of that record must be accessible and responsive.

In addition, health record data banks eliminate many of the interoperability problems experienced with a distributed health information system. In a distributed data sharing environment, each system must be able to interface with all other systems.⁹¹ With N systems, this environment would require a maximum of $N * (N-1)$ interfaces. With health record data banks, the maximum number of interfaces is only N, the number of systems.

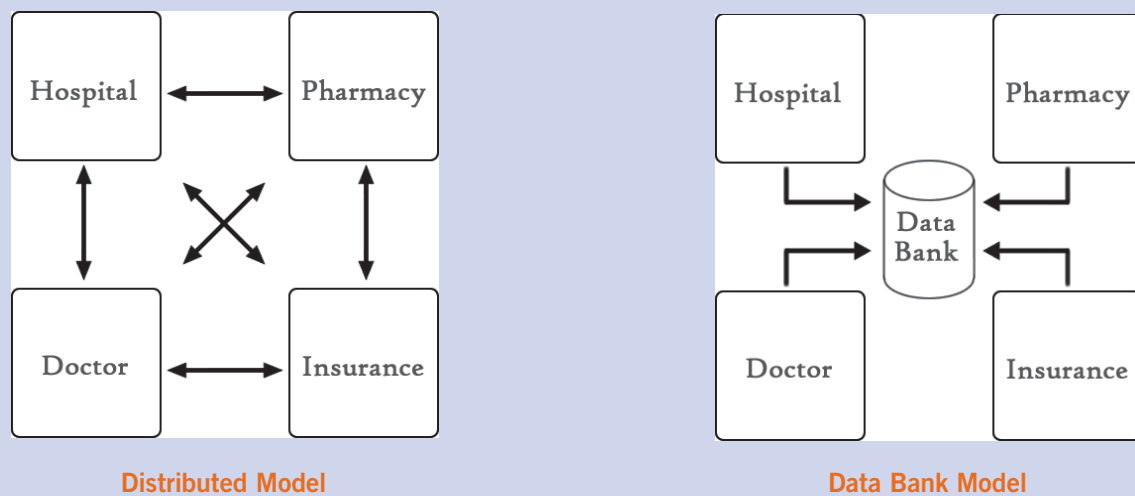


Figure 1: Building an electronic health record in a distributed health information system versus a data bank.⁹²

THE CASE FOR HEALTH RECORD DATA BANKS

Health record data banks have the potential to foster customer-driven health IT. With RHIOs or a centralized model, there are few market incentives for the participating organizations to respond to customer demands. With multiple health record data banks, though, the data custodians will have to answer directly to their customers to stay in business.

Another advantage of health data banks is that they give consumers full control and ownership of their personal health information.⁹³ Thus, for example, individuals can review anything from their most recent blood tests, to their immunization records, to the list of their current medications. Individuals may add personal health information to their own EHR, but they may not change any data submitted by another authorized user (such as their doctor). Any entries added to the EHR by the consumer would be labeled as such. In the event of an error in the record, consumers may request that the record be corrected or submit an amendment to any information that may be in dispute.

Health data banks also provide consumers with the tools they need to manage their EHRs. Once patients have established an EHR, they control the access rights to their EHR. Health record data banks provide the tools to allow patients to control access to their EHRs. All users must be authenticated to access the health record data bank, and every transaction is logged. At any point, patients can monitor and track who has accessed their EHRs. If patients choose to share this information with their doctor, their doctor can access in real time a complete EHR of their patient. After every office visit, the doctor submits to the patient's chosen health record data bank an electronic record of the office visit, including any clinical notes, test results, and prescriptions in a standard electronic data format.

Overcoming Existing Barriers to EHR Adoption

Health record data banks have the potential to help overcome the three main obstacles to EHR adoption—namely, cost, interoperability, and privacy concerns. As discussed earlier, many health care providers are reluctant to invest in health IT, even though the net social benefits outweigh the costs, because many of the benefits of health IT go to entities such as insurers and

consumers rather than to providers. Health record data banks fix this problem by creating a sustainable business model that encourages health care providers to participate.

If consumers or health insurers pay health record data banks a fee to manage their electronic health information, these payments would provide a steady stream of income to the health care providers to cover the cost of investing in health IT systems.⁹⁴ Health care providers who electronically transmitted their updates to a health record data bank would receive a small payment from the data bank after every health care encounter. Such providers would also benefit by simultaneously using the investment in IT to lower their costs and provide better quality care.

Consumers would benefit from being able to better manage their personal health information and being able to control access to that information.⁹⁵ A 2005 survey found that the majority of U.S. consumers were willing to pay at least \$5.00 per month to have electronic medical records.⁹⁶ Health record data banks could also offer consumers the choice of using an advertisement-supported web portal to reduce or eliminate the access fee. Insurers would have an incentive to sign up their beneficiaries for EHRs because EHRs will increase efficiency and help reduce medical errors, thereby benefiting insurers.⁹⁷

Health record data banks would simplify interoperability by storing all of an individual's medical information in a single repository. This repository allows individuals to create a single, lifetime health care record, which they can share with their health care providers. Currently, under HIPAA regulations, all health care providers must provide patients with a copy of their health records upon request. Patients can use this requirement to request copies of their medical records from all of their health care providers. Patients can choose to submit these records to the health record data bank where they can be digitized and used to create a complete electronic medical history. Looking forward, as health care providers adopt EHRs, the data they submit to a patient's EHR will be in a standardized and structured electronic format. This will ensure that patients' personal health information is interoperable with third-party applications.

Finally, health record data banks would help ensure the privacy of consumers' personal health information.⁹⁸ With health record data banks, consumers own the medical information in their health record, and the data bank operator is only the data custodian. Because consumers will own their medical records, they will be free to select the health record data bank of their choice. As there will likely be multiple health record data banks, competition between these companies will ensure the highest levels of security and privacy. Moreover, health record data bank operators, as the data custodian, will have a fiduciary responsibility to protect all of the private medical information stored in their database.

Once a patient's medical information is digitized in a usable format, the applications and possibilities for innovation are limitless.

Individuals would have full control over their personal health information in a health record data bank. Individuals could control, at a granular level, which providers access the information in their EHR, what information they can access, and under what conditions. This level of control would allow individuals to customize their EHR to adhere to the privacy policy that best fits their individual needs. In addition, individuals would be provided a complete audit log of who has accessed their EHR. With this level of transparency, individuals would be able to monitor any inappropriate or unauthorized access.

Additional Benefits of Health Record Data Banks

Congress should ensure that the health information network model encourages other desired characteristics such as competition and innovation. In addition to overcoming the current barriers preventing the widespread adoption of EHRs, health record data banks have the potential to help achieve these goals.

Health record data banks would create a competitive market for EHRs and ensure that health IT innovations are customer driven. In a health data bank model, each consumer has an EHR and owns his or her own personal medical data. Because there are multiple

health record data banks, consumers are not locked in to a specific data bank provider. If they choose, they can easily move to a new health record data bank. This competitiveness will help ensure that patients receive the tools they want so that they can effectively manage their health care data.

Health record data banks would have to compete for business, because patients would select the health record data bank they believe provides them the best quality and value. Thus, customer demand would encourage them to develop innovative interfaces and applications to help their customers more easily access and understand their personal health information. In addition, health record data banks may target niche markets. Patients wanting additional security and privacy controls, for example, could choose a health record data bank willing to provide that service.

RECOMMENDATIONS

Health IT will bring significant benefits to our health care system. The health care sector has made progress, but now is the time to commit to making the goal of building a national health information network a reality. We recommend Congress take the following steps:

Pass Legislation to Promote Electronic Health Records and National Health Data Standards

Federal leadership is needed to respond to the various challenges of promoting the widespread adoption and use of EHRs. Congress should work to pass additional legislation that supports the adoption of EHRs and national health data standards. Bills such as S. 1693, the Wired for Health Care Quality Act, introduced by Sen. Kennedy (D-MA) and Sen. Enzi (R-WY), and H.R. 3800, the "Promoting Health Information Technology Act," introduced by Rep. Eshoo (D-CA), would provide new leadership, funding, and organization at the national level to promote health IT.

Specifically, this legislation would make permanent the HHS Office of the National Coordinator for Health Information Technology, which is responsible for coordinating federal health IT initiatives, policies and investments. It would authorize funding for grants to promote the adoption of health IT, to develop and test quality measures, and to foster telemedicine. It would create the public-private Partnership for Health Care

Improvement, which would be responsible for developing and recommending national standards for the electronic exchange of health information. Finally, this legislation would extend the health information privacy requirements found in HIPAA to cover any operator of an electronic database of health information.

Create a Legal Framework for Health Record Data Banks

Congress should pass legislation supporting the creation of health record data banks.⁹⁹ H.R. 2991, the Independent Health Record Trust Act introduced by Rep. Moore (D-KS) and Rep. Ryan (R-WI), for example, would establish federally regulated health record data banks. This legislation establishes a fiduciary duty for each health record data bank to act for the benefit of its participants and prescribes penalties for a breach of these responsibilities. In addition, the bill prohibits the data bank operators from charging fees to health care providers for accessing or updating an EHR to which they have been given access. The legislation specifically states that all participation in the health record data bank is voluntary, and no entity, including employer, health insurance issuer or health care provider can compel participation.

To ensure continued innovation in applications that can add value to health record data banks, Congress should require that all health record data banks allow customers to share their EHR electronically with any third party. Health record data banks create the necessary market incentives to implement EHRs, but Congress should enact policies to ensure these data banks do not become data silos. Specifically, this requirement should specify that customers may allow third-party applications to access their health information. Patients may wish to use software programs on their home computer or online services that will help them better utilize their health information. Services may be offered by insurers, employers, or other companies investing in health IT applications. Thus, for example, patients may choose to subscribe to services that allows them to create a customized exercise program based on their fitness level or alerts them when new medical trials begin on a certain health condition. Once a patient's medical information is digitized in a usable format, the applications and possibilities for innovation are limitless.

Leverage Federal Resources to Ensure Access to Health Record Data Banks

The federal government is the single largest health care payer in the United States spending over \$600 billion annually on 80 million Americans through programs such as Medicare, Medicaid, and the State Children's Health Insurance Program (SCHIP).¹⁰⁰ Congress should use the federal government's substantial buying power to create change by covering the monthly access fees to participate in a health record data bank to all Medicare, Medicaid, and SCHIP enrollees.

Because adopting EHRs will lead to cost savings for health care payers, in this case the federal government, this strategy will ensure an effective investment of federal health care dollars.

The strategy of leveraging federal resources has a history of success for creating dramatic change. In 2003, the Centers for Medicare and Medicaid Services began a voluntary program, the Hospital Quality Initiative, for hospitals to report quality performance information. At first, few hospitals participated. Shortly thereafter, Congress passed the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, which tied an annual 0.4 percent payment increase to participation—and now virtually every hospital reports quality performance data.¹⁰¹ In addition, Congress can require that health plan issuers for federal employees include coverage to health record data banks as part of their covered services.

Require Medical Practices to Disclose Patient Health Information Electronically Upon Request

HIPAA established the right for individuals to obtain a paper copy of their health care records from their doctors. Congress should update this legislation to require doctors to provide patients with an electronic copy of their health information upon request.¹⁰² Under the current law, health care providers can charge reasonable fees associated with the cost of copying and mailing paper health care records, but they cannot charge fees for the time spent searching for or retrieving the records.¹⁰³

We propose establishing a threshold date after which patients will no longer be charged fees when they request electronic copies of their health records created

after this threshold date. Patients will be charged only for requests for paper records from before this date. This mandate would protect patients' right of access to their medical information while also providing an economic incentive for medical practices to move to EHRs.

CONCLUSION

EHRs and health IT hold the promise of transforming health care in America by improving quality and lowering cost. Unfortunately, progress in adopting EHRs

in the United States has been slow. Thus, it is important for Congress to find new strategies to accelerate their adoption. Health record data banks are one of several strategies to overcome many of the current barriers in EHR adoption including cost, interoperability, and privacy concerns. In addition, health record data banks will eliminate the fragmentation in medical data in today's health records. Moreover, data banks will give patients more control over and access to their personal health information. Congress should act now to help accelerate the digital transformation of the American health care system.

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