HEALTH CARE INFORMATION TECHNOLOGY

HEARING

BEFORE THE

SUBCOMMITTEE ON HEALTH

OF THE

COMMITTEE ON WAYS AND MEANS
U.S. HOUSE OF REPRESENTATIVES

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HEALTH CARE INFORMATION TECHNOLOGY

THURSDAY, JUNE 17, 2004

U.S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON WAYS AND MEANS,
SUBCOMMITTEE ON HEALTH,
Washington, DC.

The Subcommittee met, pursuant to notice, at 2:45 p.m., in room 1100, Longworth House Office Building, Hon. Nancy L. Johnson (Chairman of the Subcommittee) presiding.

[The advisory announcing the hearing follows:]

ADVISORY

FROM THE COMMITTEE ON WAYS AND MEANS

SUBCOMMITTEE ON HEALTHFOR IMMEDIATE RELEASE
June 10, 2004

CONTACT: (202) 225–3943

FOR IMMEDIATE RELEASE
June 10, 2004

Johnson Announces Hearing on Health Care Information Technology

Congresswoman Nancy L. Johnson (R–CT), Chairman, Subcommittee on Health of the Committee on Ways and Means, today announced that the Subcommittee will hold a hearing on health care information technology (IT). **The hearing will take place on Thursday, June 17, 2004, in the main Committee hearing room, 1100 Longworth House Office Building, beginning at 2:00 p.m.**

In view of the limited time available to hear witnesses, oral testimony at this hearing will be from invited witnesses only. Witnesses will include representatives from the public and private sectors to discuss the use of IT in the health care sector to reduce costs and improve patient outcomes. However, any individual or organization not scheduled for an oral appearance may submit a written statement for consideration by the Committee and for inclusion in the printed record of the hearing.

BACKGROUND:

Greater use of IT in the health care field has the potential to reduce medical errors and improve patient care. Many innovative IT projects are underway in both the public and private sectors. Yet widespread adoption of IT in the health care sector has been anemic.

The Medicare Modernization Act (P.L. 108–173) made some important advances in the use of IT for health through provisions on e-prescribing and the establishment of the Commission on Systemic Interoperability to implement health IT standards. On April 27, 2004, President Bush issued an Executive Order establishing the Office of the National Health Information Technology Coordinator and announced the goal of providing most Americans with an Electronic Health Record (EHR) within the next 10 years. The Health IT Coordinator is charged with developing a nationwide interoperable health information technology infrastructure that improves health care quality, reduces medical errors, and advances the delivery of appropriate, cost-effective, evidence-based medical care.

In announcing the hearing, Chairman Johnson stated, "Greater use of information technology has the proven ability to dramatically improve the safety and quality of our health care system while reducing costs. I am encouraged HHS is moving forward quickly on adopting the IT provisions included in MMA. I applaud the creation of the Office of the National Coordinator for Health IT as a critical step in furthering the public-private partnership that is required to bring our health care system into the 21st Century."

FOCUS OF THE HEARING:

The hearing will focus on the projects currently underway in both the public and private sectors and will explore what further initiatives are needed to increase the use of information technology throughout the health care sector.

DETAILS FOR SUBMISSION OF WRITTEN COMMENTS:

Please Note: Any person(s) and/or organization(s) wishing to submit for the hearing record must follow the appropriate link on the hearing page of the Committee website and complete the informational forms. From the Committee homepage, *http://waysandmeans.house.gov,* select *"108th Congress"* from the menu entitled, "*Hearing Archives*" (*http://waysandmeans.house.gov/Hearings.asp?congress=16*). Select the hearing for which you would like to submit, and click on the link entitled, "Click here to provide a submission for the record." Once you have followed the online instructions, completing all informational forms and clicking "submit" on the final page, an email will be sent to the address which you supply confirming your interest in providing a submission for the record. You ***MUST REPLY*** to the email and ***ATTACH*** your submission as a Word or WordPerfect document, in compliance with the formatting requirements listed below, by close of business Thursday, July 1, 2004. **Finally,** please note that due to the change in House mail policy, the U.S. Capitol Police will refuse sealed-package deliveries to all House Office Buildings. For questions, or if you encounter technical problems, please call (202) 225–1721.

FORMATTING REQUIREMENTS:

The Committee relies on electronic submissions for printing the official hearing record. As always, submissions will be included in the record according to the discretion of the Committee. The Committee will not alter the content of your submission, but we reserve the right to format it according to our guidelines. Any submission provided to the Committee by a witness, any supplementary materials submitted for the printed record, and any written comments in response to a request for written comments must conform to the guidelines listed below. Any submission or supplementary item not in compliance with these guidelines will not be printed, but will be maintained in the Committee files for review and use by the Committee.

1. All submissions and supplementary materials must be provided in Word or WordPerfect format and MUST NOT exceed a total of 10 pages, including attachments. Witnesses and submitters are advised that the Committee relies on electronic submissions for printing the official hearing record.

2. Copies of whole documents submitted as exhibit material will not be accepted for printing. Instead, exhibit material should be referenced and quoted or paraphrased. All exhibit material not meeting these specifications will be maintained in the Committee files for review and use by the Committee.

3. All submissions must include a list of all clients, persons, and/or organizations on whose behalf the witness appears. A supplemental sheet must accompany each submission listing the name, company, address, telephone and fax numbers of each witness.

Note: All Committee advisories and news releases are available on the World Wide Web at *http://waysandmeans.house.gov*.

The Committee seeks to make its facilities accessible to persons with disabilities. If you are in need of special accommodations, please call 202–225–1721 or 202–226–3411 TTD/TTY in advance of the event (four business days notice is requested). Questions with regard to special accommodation needs in general (including availability of Committee materials in alternative formats) may be directed to the Committee as noted above.

Chairman JOHNSON. Good afternoon. My apologies for the hearing having to start belatedly, but I believed it was better to allow us all to focus continuously on what I consider to be a very important issue. I am pleased to chair this hearing on the use of information technology (IT) in the health care sector. Greater use of IT has the proven ability to dramatically improve the safety and quality of health care for Americans while at the same time lowering costs, reductions in clinical errors, and elimination of redundant procedures.

Yet despite these clear benefits, widespread adoption of IT in the health field has been disappointingly slow. Our goal today is to un-

derstand the current state of the health IT industry in both the public and private sectors and to promote discussion as to how we can encourage greater use of technology throughout this industry. I have long supported efforts to increase the use of IT in health, which is why I introduced H.R. 2915, the National Health Information Infrastructure Act of 2003, last year. In addition, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA) (P.L. 108–173) made some important advances in the use of IT for health through provisions on electronic-prescribing (e-prescribing) and the establishment of the Commission on Systemic Interoperability to implement health IT standards.

I am encouraged that U.S. Department of Health and Human Services (HHS), under the leadership of Secretary Tommy Thompson and Administrator McClellan, is moving forward quickly to implement the IT provisions included in the MMA. Another important step was taken on April 27 of this year when President Bush, by Executive order, established the Office of the National Coordinator for Health Information Technology (ONCHIT) and announced the goal of providing most Americans with an electronic health record (EHR) within the next 10 years. I applaud the President's leadership and foresight in issuing an Executive order that will further the public-private partnership required to bring our health care system into the 21st century.

Today, I welcome leaders from both the public and private sectors to further our efforts to promote greater use of health IT. First, I am happy to welcome Dr. David Brailer who has been appointed as the National Health Information Technology Coordinator under the President's Executive order. In his capacity, Dr. Brailer is charged with developing a nationwide health IT infrastructure that improves health care quality, reduces medical errors, and advances the delivery of appropriate cost-effective, evidence-based medical care.

I look forward to hearing from Dr. Brailer about his vision for making a national health infrastructure a reality. We will then hear from Dr. Robert Kolodner, Acting Chief Information Officer (CIO) for the Veterans Health Administration (VHA), about the work that the U.S. Department of Veterans Affairs (VA) has done over the years in implementing IT in its health care system. The VA has long been recognized as a leader in the use of IT. I understand that Dr. Kolodner will provide us with a demonstration of the VA system.

Our second panel of witnesses consists of leaders in the private sector who are working to increase adoption of health IT. First, we will hear from Dr. Charles Safran, President of the American Medical Informatics Association. He is an Associate Professor of Clinical Medicine at Harvard Medical School and chief executive officer (CEO) of Clinician Support Technology, a health IT application provider. These very roles provide Dr. Safran with a unique view of the opportunities and challenges of health IT implementation.

We will also hear from Janet Marchibroda, CEO of the eHealth Initiative, an organization which brings together key stakeholders with a common goal of improving health care through implementation of IT systems. We will then turn to two witnesses who can provide us with specific examples of how they are using IT to improve

health care delivery and outcomes, Dr. Mark Overhage, Associate Professor of Medicine at the Indiana University School of Medicine will discuss the Indiana Network for Patient Care which has electronically linked all 5 major Indianapolis hospital systems operating a total of 11 geographically separated hospitals, thus creating a community-wide electronic medical record system.

Finally, Dr. Andrew Wiesenthal, Associate Executive Director of Kaiser Permanente Clinical Information Systems will discuss the $3 billion health IT initiative that Kaiser is currently implementing to bring electronic medical records to its members. I believe we have a very distinguished set of witnesses before us today. I look forward to hearing all of their testimony. These are exciting times for those of us interested in health IT. I look forward to working with all of you as we move forward to improve the safety and quality of our health care system and as we seek to press ever forward the day in which Americans across the age spectrum can benefit from e-prescribed and electronic-health records throughout the health care delivery system in our country. I thank you all for being here. Mr. Stark.

Mr. STARK. Madam Chair, I want to thank you for bringing us here today to talk about the use of IT in our medical delivery system. The appropriate and wide-spread use of IT, I think, offers just enormous potential, whether it is in patient care, reducing cost, safety, you name it. The congressional debate, it seems to me, has moved off questioning the role of IT and patient care and medical care delivery. I think that is perhaps accepted broadly. So, the current debate has shifted to the fact that we have a bunch of operating or operable systems, and how can we make them interoperable and therefore, I suspect, much more valuable to everyone?

I suppose we get right to the crux of why we are here, and it is, is there anything that government can do to facilitate a universal seamless system? Or should we just stay out of it? My experience, I hate to date myself, but I was there at the beginning of Visa and MasterCard and Bank of America went their own way for a while. Those cards didn't talk to each other for a lot of the same reasons that I suspect that medical systems don't talk to each other. They find out secrets about other's customers.

Well, lo and behold, or for whatever reason, maybe the Fed saying, "We won't clear these items unless you all agree to a uniform protocol and so forth," it is a system now whereby I guess I could go to Germany or Baghdad and stick my Visa card in an automated teller machine, and it would quickly decide that I am worthless and spit the cards back at me and probably call the police and/or certainly they would call my wife and say, "What is he doing here?"

I see no reason why we can't, therefore, do that here. I guess it is this we have before us. We have all the players, every instrument in the orchestra is out there and they are all first chair. The question is, does the government wave our arms and make it sound like Shazala or Spike Jones? This is what I hope the witnesses can tell us through the day. Thank you very much. I look forward to hearing their testimony.

Chairman JOHNSON. Thank you, Mr. Stark. Dr. Brailer.

STATEMENT OF DAVID BRAILER, M.D., PH.D., NATIONAL HEALTH INFORMATION TECHNOLOGY COORDINATOR, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Dr. BRAILER. Chairman Johnson, Representative Stark, thank you. Other Members of the Committee, thank you for having me here today on my first formal testimony on Capitol Hill to discuss the Administration's efforts to increase the use of IT and to address the issues that you have raised. As you know, this is a high priority for the President and for Secretary Thompson. The President has called for an EHR infrastructure to be available to most Americans in the next 10 years and created my position as one way to help achieve that goal. Your leadership and that of the Subcommittee on this issue, through e-prescribing and other health IT-related provisions in the MMA of 2003, are also greatly important and appreciated.

This spring, as you know, the President reiterated his strong commitment to this issue by creating the ONCHIT. This was done by Executive order. I was appointed on May. In this roll, I am working to bring together the resources and talent in both the private and public sectors to drive adoption of IT. There is unprecedented enthusiasm and commitment for changing the day-to-day world for health care, and my goal is to focus this into a well-developed plan in a set of coordinated actions to accelerate the widespread adoption of EHRs.

The Administration has historically made significant progress in this area. Last year, we licensed Systematized Nomenclature of Medicine (SNOMED), a comprehensive set of clinical terminologies, to make it available without charge for care anywhere in the United States. We also adopted 20 sets of clinical terminology standards across Federal agencies through the Consolidated Health Informatics Initiative. These standards will make it easier for information to be shared across agencies and could serve as a model for the private sector.

The Executive order of April 27 not only created the new office, but it also required the departments and agencies of the executive branch of the Federal government to work together to achieve our common goal of using health IT to improve safety, quality, and efficiency of health care in every area of the United States.

Specifically, we will work with every other executive branch department and agency, including the VA, who are here today, the U.S. Department of Defense (DOD), and the Office of Personnel Management (OPM) as well as the private sector to develop and implement the strategic plan to accelerate IT adoption in both the public and private sectors.

This plan will be guided in key guiding principles that include personalization of care, market-based solutions, shared public and private investment, and individually controlled information as a common good for public health and research. Given the importance of this topic, we must work with both the internal and external stakeholders so that we can move forward quickly.

The President envisions a nationwide health IT infrastructure that ensures that appropriate information will be available at the time and place of care, resulting in improved quality, fewer errors, and perhaps even lower health care costs. This new infrastructure

will help connect physicians, hospitals, and consumers. This would give consumers and clinicians secure and controlled access to important information that is needed to make informed decisions about health care and their health while ensuring individual information—individually identifiable information—is both confidential and protected. If designed and implemented correctly, health information-exchange networks could promote a more efficient delivery system.

It will also help to improve coordination of care among hospitals, labs, physician offices, and other health care providers. For example, the national availability of patient health information could allow a Medicare beneficiary with multiple chronic diseases to receive the same high-quality care at home or while traveling without needing to carry their information. Many patients take multiple drugs or have histories of drug reactions, but decentralized and paper-based records often don't reveal this fully when needed. Regardless of where a beneficiary is receiving care, health information-exchange networks would allow for their information, medical history, potentially serious drug interactions and other things to be available in real time along with out-of-pocket costs and therapeutic alternatives all before the physician transmits a prescription to a pharmacy.

The national availability of de-identified patient health information will also enable research on health outcomes that can more rapidly identify the most effective diagnostic and treatment options for clinicians and patients and will accelerate the translation of new research findings into clinical practice. I will highlight, today, HHS initiatives that are critical in meeting our goal of making EHRs available for all Americans. These initiatives relate to, first, automating clinical practice; two, interconnecting care; and three, improving population health.

Our efforts to automate practice have been focused on identifying and implementing tools to accelerate the adoption and use of EHRs and e-prescribing. At President Bush's direction in the Executive order, HHS is preparing a report on options to create incentives in Medicare for other HHS programs that encourage the adoption of interoperable EHRs and e-prescribe. Also the OPM is identifying similar options through the Federal Employees Health Benefit Program. The VA and DOD are also identifying ways to transfer technology into the private sector, particularly for rural and underserved care delivery areas.

The HHS is also working to implement the provisions of the recently enacted MMA, including those to encourage e-prescribing by physicians participating in Medicare through the use of standards and incentives. This year, the Agency For Health Care Research and Quality (AHRQ) will spend $50 million on health IT research and demonstration projects that are aimed at improving safety, quality, and efficiency. The AHRQ is also taking significant steps to facilitate interconnecting care through the support of five State-level health information-exchange networks which will be announced in a few months.

Beyond improving health care delivery, improved health information-exchange will allow new bio-surveillance initiatives to tap ITs to improve the Nation's capabilities of detecting and quantifying

public health outbreaks in bioterrorism. BioSense is one example of a new IT-enabled program which will allow the Centers for Disease Control and Prevention to collect and analyze existing health care data quickly to identify potential outbreaks or health hazards and to respond accordingly. The Secretary and the President are committed to improving the safety and efficiency of health care by increasing the use of IT. The Administration has made significant progress in this area, and we will continue to work diligently to meet the President's goal of EHRs within 10 years.

On July 21st of this year, we will hold the Secretary's second Health IT Summit where we will report on the progress of the Health IT Strategic Plan ordered by the President and will obtain input from those in the private sector who will actually develop and use these systems. Leaders from the government and from the health care and IT industries will convene and work together to identify specific actions that will lead to rapid progress. We have an unprecedented opportunity to improve both the delivery of health care and population health through the effective use of IT.

Members of the Committee, I am committed to helping you and others make and maintain our health care industry as a national treasure. I thank you again for the opportunity to address you, and I would be happy to answer any questions you have. Thank you.

[The prepared statement of Dr. Brailer follows:]

Statement of David Brailer, M.D., Ph.D., National Health Information Technology Coordinator, U.S. Department of Health and Human Services

Chairwoman Johnson, Representative Stark, distinguished members of the Committee: I thank you for inviting me here today to discuss the Administration's efforts to increase the use of information technology throughout the health care industry. As you know this is a highpriority for the President and Secretary Thompson. The priority has been further accelerated by the President's call to make electronic health records (EHR) available to most Americans in the next 10 years and by the creation of my position to achieve this goal. Your thoughtful leadership and that of your subcommittee toward achieving this goal has been widely recognized and demonstrated through the e-prescribing and other health information technology (HIT) related provisions in Medicare Prescription Drug, Improvement and Modernization Act of 2003.

As a result of the President and the Secretary's strong commitment to this issue, the Office of the National Coordinator for Health Information Technology has been established to meet the goals of the Executive Order announced earlier this spring. In my new role as National Coordinator for Health Information Technology, I will be working with the Administration, Congress and the private sector to bring together the resources and talent to drive the adoption of HIT in the health care system. There is unprecedented enthusiasm and commitment for changing the day-to-day world of health care with HIT from leadership across sectors, and my goal in the next year is to focus this into a well-developed plan and a set of coordinated actions to accelerate the widespread adoption of electronic health records and e-prescribing.

The Administration has already made significant progress in this area. Specifically,

- Last year, we licensed SNOMED (Systematized Nomenclature of Medicine, a comprehensive set of clinical terminologies) to make it available without charge to everyone in the United States.
- As part of the Federal Health Architecture, we adopted clinical terminology standards across federal agencies through the Consolidated Health Informatics (CHI) initiative. The Department of Health and Human Services (HHS), Department of Defense (DoD), Department of Veterans Affairs (VA), and other Executive Branch agencies have endorsed 20 sets of standards, such as standards for medications, labs, and immunizations. These standards will make it easier for information to be shared across agencies and could serve as a model for the private sector.

- The Secretary created the Council on the Application of Health Information Technology (CAHIT), which has been the coordinating and internal advisory body for HHS. CAHIT has served as the primary forum for identifying and evaluating activities and investments that promote and/or complement evolving private sector initiatives and strategies.

The Executive Order of April 27th not only created my position within the new Office, but it also required the Departments and agencies of the Executive Branch of the federal government to work together to develop and align policies and programs that will achieve our common goal of using HIT to improve the safety, quality and efficiency of health care in every area of this country. I have also been given the responsibility to direct the HHS HIT programs, and to coordinate these with those of other Executive Branch Departments and agencies. Specifically, HHS will coordinate with other Executive Branch Departments and agencies to develop and implement a strategic plan for and to use resources to accelerate HIT adoption in the private sector. Both the DoD and VA have surpassed the private sector in successfully incorporating HIT into the delivery of health care, and will play a central role in adoption efforts. The Office of Personnel Management (OPM), as the purchaser of healthcare for federal employees, has a unique role and the ability to encourage the use of electronic health records through the Federal Employee Health Benefits Program. It can join other purchasers who are developing programs that support adoption of HIT by physicians and hospitals, and its use in improving and rewarding quality. In addition to collaboration with federal agencies and Departments, I will also coordinate outreach and consultation by the federal government with interested public and private organizations, groups, and companies. We will coordinate with the National Committee on Vital and Health Statistics and other advisory committees to do this, and will enhance relationships with public-private collaboratives that are advancing HIT adoption.

The President's vision is to develop a nationwide HIT infrastructure that ensures appropriate information is available at the time and place of care, resulting in improved health care quality, fewer medical errors and may even reduce health care costs. This new infrastructure will help to connect physicians, hospitals and consumers in every location of our country. This would give consumers and clinicians secure and controlled access to all the important information they need to make informed decisions about their health and health care, while ensuring individually identifiable information is confidential and protected. Designed and implemented correctly, health information exchange organizations could promote a more efficient health care delivery system. They will also help to improve coordination of care through the secure exchange of information among hospitals, labs, physician offices, and other health care providers.

Health information exchange networks could be privately operated and governed by many State, regional or community level health information exchange authorities. These authorities would have responsibility for protecting information and ensuring that data is used to advance the public interest, and used in compliance with applicable State and federal laws. Regional health information exchange networks could keep indexes of where patients were treated and could intercommunicate, but not create a national database. A set of standards and secure networks would allow information—such as lab results, x-rays and medical history as well as clinical guidelines, drug labeling and current research findings—to move to where needed, immediately and securely. Information would only be accessible to authorized users and aggregated at the individual patient level for the time that it is needed, without being stored in a database. The purpose of this information exchange would be to personalize care in such a way that each patient could be diagnosed and treated as an individual rather than a disease type. For example, the national availability of patient health information could allow a Medicare beneficiary with multiple chronic conditions to receive the same high quality care at home or while traveling, without needing to carry their information or fear that new findings or treatments may not be known to all possible health care providers. Many patients take multiple drugs or have histories of drug reactions, but decentralized paper records often do not reveal this fully. Regardless of where a beneficiary is receiving care, health information exchange networks would allow for information about medication history and potentially serious drug interactions to be available in real-time, along with out of pocket costs and therapeutic alternatives, before the physician transmits a prescription to a pharmacy.

The national availability of de-identified patient health information will also enable research on health outcomes that could more rapidly identify the most effective diagnostic and treatment options for clinicians and patients and will accelerate the translation of new research into clinical practice. Across HHS, there are several

inter-related HIT programs that are aimed at improving the delivery of health care and enhancing public health surveillance. I will highlight the key initiatives that are critical to meeting our goal of making electronic health records available for all Americans. These initiatives fall into three categories: 1) automating clinical practice, 2) interconnecting care, and 3) improving population health.

Clinical Practice

Our efforts to automate practice have been focused on identifying and implementing tools to accelerate the adoption and use of electronic health records and e-prescribing. At President Bush's direction, in the Executive Order, HHS is preparing a report on options to create incentives in Medicare or other HHS programs to encourage the adoption of interoperable electronic health records and e-prescribing, and OPM will report on similar options for encouraging the adoption of such technology through the Federal Employee Health Benefit Program. As you know, HHS isalso implementing the provisions in the recently enacted Medicare Modernization Act to encourage electronic prescribing by physicians participating in Medicare through the use of standards and incentives. The National Committee on Vital and Health Statistics has already conducted two hearings and is expected to provide recommendations on standards to the Secretary before September 2005, the date specified in the new law. The Food and Drug Administration's recently promulgated requirement for bar coding will also enable e-prescribing in hospitals and will reduce the incidence of some forms of medication delivery errors. Additional provisions of the Medicare Modernization Act support demonstrations providing incentives for physician practices to improve the quality and safety of care for Medicare beneficiaries through effective implementation of selected HIT systems, in up to four States.

In addition, HHS' Indian Health Service (IHS), with the help of other HHS agencies, is developing an enhanced EHR system, a version of the VA's VistA product, which can be used in IHS and tribal health care facilities. The enhanced system will improve care for patients by allowing appropriate information to be available whenever and wherever they seek care within the IHS system.

This year, the Agency for Healthcare Research and Quality (AHRQ) will spend $50 million on health information technology research and demonstration projects aimed at improving the safety, quality, efficiency and effectiveness of care. Using a portion of these resources, AHRQ will establish a Health Information Technology Resource Center, a much-needed resource that will provide technical assistance, expert health information technology support, educational services and other services to HHS grantees to support the implementation of HIT into clinical practice. President Bush's fiscal year 2005 budget request includes an additional $50 million to expand health information technology demonstration projects, particularly targeted to health data exchange by providers. This request would double federal investments in this area.

We are also examining how to address regulatory barriers to HIT adoption. HHS recently created a new regulatory exception to the physician self-referral ("Stark") prohibition, Section 1877 of the Social Security Act, which will allow provider organizations to furnish health information technology items or services to physicians if certain criteria are satisfied. This new exception will facilitate adoption of HIT and participation in local health information exchange networks by assuring hospitals and doctors that they can work together to finance the acquisition of community-wide health information systems

Interconnecting Care

Beyond fostering the adoption of electronic health records, it is critical for HHS to support the appropriate exchange of health information across settings of care as needed. Fundamental to information sharing in nearly every form is the use of standards to allow caregivers to easily share and use patient information. At HHS' request, the international standards-setting organization known as Health Level 7 (HL–7) has established a draft standard defining the set of functions of an electronic medical record. HHS will continue to work with HL–7 and others to define standards for transmitting complete electronic health records.

HHS has already adopted strong national privacy and security standards for health plans, health care providers and others covered by the Health Insurance Portability and Accountability Act of 1996 (HIPAA). These standards, which are carefully balanced to ensure individuals' access to quality care, will guide the development of a national health information infrastructure and form the basis of the safeguards to protect the privacy and confidentiality of personal health information. As both the President and Secretary Thompson have made clear, maintaining privacy and security protections for individually identifiable health information is a

primary concern as health information exchange organizations are developed across the country.

In addition to the important work and progress we have made in the development and adoption of clinical and technical standards, we have also taken significant steps recently to facilitate interconnecting care through the support of health information exchange networks. Over the next few months, AHRQ will fund five State-level HIT projects. This project will build on nascent health information exchange networks and current State-level planning activities by providing crucial funding, technical assistance and coordination. In fiscal year 2005, HHS and AHRQ will continue to complement and expand these initiatives with up to $50 million to support the development of health information exchange networks.

Improving Population Health

HHS has new HIT programs underway to advance the use of electronic medical records nationally. This effort should also benefit population health activities and improve preparedness. President Bush's fiscal year 2005 budget proposes $130 million at CDC for a new biosurveillance initiative to tap information technology to improve the nation's capabilities to detect and quantify public health outbreaks and bioterrorism, as part of a coordinated multi-departmental effort. Key to this effort is BioSense, which will allow CDC to collect and analyze existing health-care data quickly to identify potential outbreaks or health hazards and respond accordingly. Information then could be shared quickly with other federal agencies and State and local health officials to promote more effective coordination. CDC also supports the National Electronic Disease Surveillance System, which promotes the use of standards to advance development of efficient, integrated and interoperable surveillance systems at federal, State, and local levels.

In addition to these activities, HHS is taking a leadership role in promoting and supporting the widespread adoption of HIT through: (a) providing a national vision; (b) leading by example; (c) developing a framework for strategic action; and (d) planning initiatives to promote competition and innovation. The strategic plan that HHS will develop in collaboration with DoD, VA, and OPM, to accelerate HIT adoption in the private sector, will be grounded in key guiding principles including: 1) personalization of care, 2) market-based solutions, 3) shared public and private investment, and 4) individually controlled information as a common good for public health and research.

We will coordinate with the private sector to develop market institutions that will enable the widespread use of EHRs and sustainable health information exchange networks to improve delivery of care and health outcomes. For example, we are exploring how to support physicians and other purchasers of HIT so that they can choose technology that meets their needs and assess costs and benefits. Also, we are looking at how the private sector can measure and report the conformance of specific products to a defined set of benchmarks. These and other market institutions will make our national investment in HIT effective and sustainable and will ensure ongoing investment in product research and development.

We are aware that every day, Americans are dying of medical errors and are not always getting the best treatments. We need results that will change care delivery and that will last. The Secretary and the President are firmly committed to improving the safety and efficacy of health care by increasing the use of information technology throughout the health care industry. The Administration has already made significant progress in this area, and we will continue to work diligently to meet the President's goal for most Americans to have electronic health records within 10 years.

On July 21, 2004, we will hold the Secretary's Second HIT Summit, where we will report on the progress of the HIT Strategic Plan ordered by the President and obtain input from those in the private sector who will actually develop and use the HIT systems. Leaders from the government and the health care and information technology industries will convene and work together to identify specific actions that will lead to rapid progress. Overwhelming support from leaders in the public and the private sector presents an unprecedented opportunity to improve both the delivery of health care and population health through effective use of HIT.

Members of the Committee, I am firmly committed to contributing what I can to helping you and others make our health care industry a national treasure. I thank you again for the opportunity to address you on this important health care matter. I look forward to your continued support and leadership that will further enable the Executive Branch and private sector leadership to transform our paper based health care system into an electronic, quality-based system that we all can count on.

Chairman JOHNSON. Thank you very much, Dr. Brailer. Dr. Kolodner.

STATEMENT OF ROBERT M. KOLODNER, M.D., ACTING CHIEF HEALTH INFORMATICS OFFICER AND DEPUTY CHIEF INFORMATION OFFICER FOR HEALTH, U.S. DEPARTMENT OF VETERANS AFFAIRS

Dr. KOLODNER. Thank you very much, Madam Chair and Members of the Subcommittee. Good afternoon. I am pleased to be here to share VA's experience with the development, implementation, and clinical acceptance of our EHR, VistA. The VHA encompasses about 1,300 sites of care, including 158 hospitals and over 850 community-based outpatient clinics as well as long-term care facilities. The VA treats almost 5 million veterans each year among our 7.5 million veteran enrollees. Our veterans tend to be older, sicker, and poorer than age-matched individuals.

VistA supports all of this. The VA is a leader in the world of EHRs. The very prestigious Institute of Medicine recognized that leadership by stating that VHA's integrated health information system, including its framework for using performance measures to improve quality, is considered one of the best in the Nation.

The VA has implemented health IT extensively to improve the quality and safety of its medical care while protecting the privacy of our veterans. VistA began as the decentralized hospital computer program and became today's VistA in the mid-nineties. Our next generation VistA will be HealtheVet-VistA. Our publicly available version of VistA is HealthePeople-VistA.

The VA's VistA is a comprehensive EHRs system installed nationwide and supporting patient-centered care. Let me describe a few key components. First, the Computerized Patient Records System (CPRS) is recognized as one of the most sophisticated clinical applications in the world, providing immediate access to shared information and eliminating duplicate orders. The CPRS has been implemented in all VA medical centers, nursing homes, and clinics, giving providers access to patient information across multiple sites and clinical disciplines.

The CPRS virtually eliminates errors caused by ineligible handwriting and misinterpretation of dosages and strengths or medication needs because 93 percent of all VA medication orders are entered directly by the ordering provider in all care settings. Moreover, physicians are immediately alerted to potentially dangerous drug combinations or to a patient's allergy to a drug before they can key the order because of built-in automated drug checks.

Second, the Bar Code Medication Administration system ensures that each patient receive the correct medication in the correct dose at the correct time. Third, CPRS is further enhanced by VistA imaging, which is also in use at all VA medical centers and provides the means to capture and display a wide variety of images to the physician. Fourth, VA has developed My HealtheVet, a secure web-based personal health records system designed to provide veterans key parts of their medical record and access to medical information.

What benefit has the EHR helped bring? Decision support tools have facilitated the treatment of chronic disease and delivery of preventative care. Comparing VA patient care quality data from 2003 with Medicare data from 2003 and with the best reported performance of any other health care system in the United States, VA care sets the benchmark for every 1 of 18 clinical performance indicators.

VistA has helped to make this happen and provide the confirming data. At VA, we know that the support and input of clinicians is essential to the successful deployment of EHRs systems. This involvement increases user acceptance and enables us to meet the needs of the providers, teams, clinics, wards, and medical facilities.

Over the past 20 years, VA has developed an effective, repeatable process for successful use of clinical applications. The VA is now working with the Centers for Medicare and Medicaid Services (CMS) to stimulate the broader adoption and effective use of EHRs in the United States. We both strongly encourage the use of high-quality private vendor EHRs.

Further, CMS and VHA are collaborating on making available a VistA-Lite version of VA's VistA system. VistA, that is owned by the American taxpayer and has been freely available via the Freedom of Information Act (P.L. 104–231)—the Indian Health Service is using it. For anyone who wants to use it, VA will continue to make available its public version, Health*e*People VistA.

Secretary Principi has clearly stated that will continue to be VA's position. This position is strongly supported by congressional Members on both sides of the aisle and by the President and Secretary Thompson. In VA, the EHR is essential to effectively caring for our veterans. Today, we are working hard on improving data quality and standardization. In 2001, to ensure our future, we began building our next generation system, HealtheVet-VistA.

[The prepared statement of Dr. Kolodner follows:]

Statement of Robert M. Kolodner, M.D., Acting Chief Health Informatics Officer and Deputy Chief Information Officer for Health, U.S. Department of Veterans Affairs

Madam Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss the importance of electronic health records and the role of the Department of Veterans Affairs (VA) in the development, use, and sharing of this valuable technology.

Recently, President Bush outlined an ambitious plan to ensure that most Americans have electronic health records within 10 years. The President noted a range of benefits possible with the expanded use of information technology, including improved health care quality; reduced frequency of medical errors; advancements in the delivery of appropriate, evidence-based medical care; greater coordination of care among different providers; and increased privacy and security protections for personal health information.

In addition to these benefits, the transition from a paper-based medical record to an electronic health record (EHR) brings with it cost-saving efficiencies in how information is managed. In a paper-based environment, a lot of time is spent simply handling paper. Entire jobs are devoted to filing, retrieving, copying, distributing, and tracking paper records and radiology films. The implementation of an EHR does not eliminate these activities altogether, but it does drastically reduce clinicians' dependence on hard-copy information. Clinicians are able to access the information they need without requesting it from the file room or searching through stacks of files in their offices. Medical records and radiology films can be accessed on-line, so that there is no need to repeat studies when test results or films cannot be located.

With an EHR, most VA sites have been able to decrease the space devoted to file rooms, retrain staff members to perform data management tasks, and reduce the costs associated with printing, duplicating, and maintaining hard-copy records and films.

For decades, VA has developed innovative IT solutions to support health care for veterans. Over the past several years, VA has worked with federal, state, and industry partners to broaden the use of information technology in health care. VA strives to continue the development of the EHR while protecting the privacy of our veteran population and maintaining the integrity of our systems. These efforts have laid the groundwork for the President's health IT initiative.

With one of the most comprehensive electronic health record (EHR) systems in use today, VA is a recognized leader in the development and use of EHRs and other information technology tools. Beginning in the late 1970's—before such tools were commercially available—Veterans Health Administration (VHA) developed software applications for a variety of care settings, including inpatient, outpatient, and long-term care. These applications form the foundation of VistA—the Veterans Health Information Systems and Technology Architecture, the automated health information system used throughout VHA.

In the mid-1990's, VHA embarked on an ambitious effort to improve the coordination of care by providing integrated access to these applications through implementation of an electronic health record, known as the Computerized Patient Record System or CPRS.

With CPRS, providers can access patient information at the point of care—across multiple sites and clinical disciplines. CPRS provides a single interface through which providers can update a patient's medical history, submit orders, and review test results and drug prescriptions. The system has been implemented at all VA medical centers nationwide and at VA outpatient clinics, nursing homes, and other sites of care.

The Benefits of Electronic Health Records

Electronic health records are appealing for a number of reasons. *The most compelling reason to use information technology in health care is that it helps us provide better, safer, more consistent care to all patients.* The President referred to a 1999 report in which the Institute of Medicine (IOM) estimated that between 44,000 and 98,000 Americans die each year due to medical errors. Many more die or suffer permanent disabilities because of inappropriate or missed treatments in ambulatory care settings. IOM cited the development of an electronic health record as essential for reducing these numbers and improving the safety of health care. In its 2002 publication *Leadership by Example*, IOM noted that "[c]omputerized order entry and electronic medical records have been found to result in measurably improved health care and better outcomes for patients."

How can EHRs improve patient safety and quality of care? First, with an EHR, all relevant information is available—and legible. A provider can quickly review information from previous visits, have ready access to clinical guidelines, and survey research results to find the latest treatments and medications. All of this information is available wherever patients are seen—in acute settings, clinics, examining rooms, nursing stations, and offices. With CPRS, providers can quickly flip through electronic "pages" of a patient's record to review or add information. All components of a patient's medical record—including progress notes, referrals, orders, test results, images, medications, advance directives, future appointments, and demographic data—are readily accessible at the point of care.

Many of us see different doctors for different medical conditions. How many of these physicians have access to all of the information that has been collected over the course of these visits? In VHA, patient records from multiple sites and different providers can be viewed at the same time at the point of care. This is simply not possible with paper records. Additionally, most clinicians find EHRs more convenient to use than traditional paper records. They are less cluttered, easier to read, and faster and more reliable for finding items of information providers are seeking, such as the results of a specific type of laboratory test over a period of time.

In addition to making medical records more accessible, EHRs can help clinicians better document the reasons a patient sought care and the treatment that was provided. Given the time constraints they face, many physicians resort to writing brief, sometimes cryptic notes in a patient's chart, and then write more complete documentation when they have time. EHRs enable clinicians to document care quickly and thoroughly, and provide reminders to complete any documentation that is overdue.

CPRS, for example, allows clinicians to enter progress notes, diagnoses, and treatments for each encounter, as well as discharge summaries for hospitalizations. Cli-

nicians can order lab tests, medications, diets, radiology tests, and procedures electronically; record a patient's allergies or adverse reactions to medications; or request and track consults with other providers.

More information isn't always better if we can't use it. Even if we could transfer paper records quickly and reliably from one provider to another, and make sure that the information in records was complete, many hard-copy patient records simply contain too much information for a clinician to sift through effectively. There is always the possibility that something crucial could be missed. When health information is stored electronically, however, we can make use of software tools to analyze that information in real-time. We can target relevant information quickly, compare results, and use built-in order checks and reminders to support clinical decision-making. These capabilities promote safer, more complete, more systematic care.

Consider the benefits we have seen in VHA in the area of medication ordering. When orders for medications are handwritten or given verbally, errors and mistakes inevitably occur. However, when physicians use computerized order-entry systems to enter medication orders electronically, errors caused by illegible handwriting or misinterpretation of dosages, strengths, or medication names are virtually eliminated. CPRS includes automated checks for drug-drug or drug-allergy interactions, alerting the prescribing physician when potentially dangerous combinations occur. Currently, 93% of all VHA medication orders are entered directly by the ordering provider.

Information technology can also serve to reduce the number of errors that occur when medications are given to a patient. VHA's Bar Code Medication Administration system (BCMA) is designed to ensure that each patient receives the correct medication, in the correct dose, at the correct time. In addition, the system reduces reliance on human short-term memory by providing real-time access to medication order information at the patient's bedside.

BCMA provides visual alerts—prior to administration of a medication—when the correct conditions are not met. For example, alerts signal the nurse when the software detects a wrong patient, wrong time, wrong medication, wrong dose, or no active medication order. These alerts require the nurse to review and correct the reason for the alert before actually administering the drug to the patient. Order changes are communicated instantaneously to the nurse administering medications eliminating the dependence on verbal or handwritten communication of order changes. Time delays are avoided and administration accuracy is improved.

BCMA also provides a system of reports to remind clinical staff when medications need to be administered or have been overlooked, or when the effectiveness of administered doses should be assessed. The system also alerts staff to potential allergies, adverse reactions, and special instructions concerning a medication order, and order changes that require action.

The Importance of Standards

The use of electronic health records and other information technology tools in a single medical office can improve health care quality, reduce medical errors, improve efficiency, and reduce costs for the patients treated there. However, as the President noted, the full benefits of IT will be realized when we have a coordinated, national infrastructure to accelerate the broader adoption of health information technology.

The National Health Information Infrastructure (NHII) initiative recognizes the importance of data and communications standards in developing a comprehensive network of interoperable health information systems across the public and private sectors. Interoperability is dependent, in large part, upon the adoption of common standards. Without data standards, we might be able to exchange health information, as we do now when we copy and send paper records, but we won't be able to use it as effectively to deliver safer, higher quality care using clinical alerts and reminders.

VA was instrumental in the formation of the interagency Consolidated Health Informatics (CHI) initiative, and works closely with the Department of Defense (DoD) and the Department of Health and Human Services (DHHS) on CHI and related projects. CHI, which is part of the President's eGov initiative, was established to foster the adoption of federal interoperability standards related to health care as part of a joint strategy for developing an electronic health record. To date, CHI has endorsed 20 communications and data standards, in areas such as laboratory, radiology, pharmacy, encounters, diagnoses, and nursing information.

We have seen the value of standards within VHA. Like other EHRs, CPRS allows users to search for specific medical terms, dates of care, diagnoses, and other information quickly, without having to review multiple documents. Although this search feature is a handy tool, information retrieval can be hampered by a lack of standard naming conventions. Virtually all clinical documents throughout VHA are stored in

CPRS; as a result, patient records containing hundreds, or even thousands, of notes are becoming common. As the volume of online information increases, the task of finding a specific note or report among them can be difficult, particularly when different clinicians and sites assign different names to similar documents.

A 2001 article in the Journal of the American Medical Informatics Association described VHA's efforts to speed retrieval of clinical information, by creating a controlled terminology for indexing the information stored in CPRS.[1] This collaborative effort among clinicians, informaticists, and health information management professionals will improve document selection, and support the ability to transfer and incorporate documents from other facilities.

The ability to aggregate and compare information from multiple care sites has reinforced the importance of standardization for computable data as well. VHA is developing a Health Data Repository to store clinical information transmitted from VHA sites across the country. The repository will provide a central source of data for analysis, management reporting, performance monitoring, and research. Yet, the ability to aggregate these data from different sites will depend on the degree to which data fields are standardized.

Data Standards and Interoperability

Our data standardization efforts have also improved our ability to share information with other agencies. In accordance with the various confidentiality statutes and regulations governing these records, including the Privacy Act, the HIPAA Privacy Rule, and several agency-specific authorities, safeguards have been implemented to ensure that the privacy of individuals is protected throughout these collaborative projects.

I'd like to highlight our work with the Department of Defense. To support the transition of individuals from active-duty to veteran status, the optimal use of health resources through sharing agreements, and VA–DoD collaborations on deployment health issues and health conditions, we need to exchange clinically relevant health data between the departments—and we need to exchange it electronically.

To this end, VA and DoD have developed a joint strategy to ensure the development of an interoperable electronic health record by 2005. The approach is described in the Joint VA/DoD Electronic Health Records (EHR) Plan—Health*e*People (Federal) strategy and includes three components: 1) joint adoption of global information standards, 2) collaborative software application development/acquisition, and 3) development of interoperable data repositories. The EHR Plan provides for the exchange of health data by the departments and for the development of a health information infrastructure and architecture supported by common data, communications, security, and software standards and high-performance health information systems.

The EHR Plan will guide VA and DoD in the joint development of a "virtual" health record accessible by authorized users throughout DoD and VA. This virtual health record will be achieved through the transparent interaction of health systems or applications between DoD and VA. Providers of care in both departments will be able to access relevant medical information to aid them in patient care.

In support of the President's Management Agenda, the President's Task Force (PTF) to Improve Health Care Delivery For Our Nation's Veterans provided recommendations for the departments' goals to provide a seamless transition from military to veteran status, including the virtual health record. Primary governance of these joint efforts is the responsibility of the Congressionally-mandated VA/DoD Health Executive Council (HEC) and Joint Executive Council (JEC).

The first phase of the plan, the Federal Health Information Exchange (FHIE), was deployed July 2002. FHIE provides historical data on separated and retired military personnel and beneficiaries from DoD's Composite Health Care System (CHCS) to the FHIE framework; the information is then accessible in VA through CPRS. These data include DoD admission/discharge/transfer (ADT) information, laboratory information, radiology, discharge summary and cytology reports, allergy information, consultation reports, prescription data from government and retail pharmacies from the DoD Pharmacy Data Transaction Service (PDTS), and outpatient associated medical codes extracted from the DoD Standard Ambulatory Data Record (SADR). Currently, there are over two million unique DoD electronic records available for retrieval from the FHIE repository, and the volume of information available through FHIE continues to grow as individuals are discharged to veteran status.

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[1] Brown, Steven H., MS, MD, et. al. "Derivation and Evaluation of a Document-naming Nomenclature." *Journal of the American Medical Informatics Association* 8, no. 4 (2001): 379–389.

The next phase of the EHR Plan is the joint development and acquisition of interoperable data repositories by the departments. The departments have formed an active working integrated project team to implement the exchange of clinical data between the VA Health Data Repository (HDR) and the DoD Clinical Data Repository (CDR). By linking these two systems, the departments will achieve interoperability of health information between DoD's CHCS II and VA's HealtheVet-VistA. This project, known as "CHDR", will demonstrate the bi-directional capability to exchange pharmacy and demographic data in a prototype in 2004, and will achieve interoperability by 2005. Using clinical decision support applications, providers in both departments will be able to access and use relevant health information to aid them in making medication decisions for their patients, regardless of whether that information resides in VA's or DoD's information systems.

Other examples of VA–DoD work include the DoD/VA Interagency Virtual Private Network (VPN), which allows for the secure exchange of clinical data between the two departments, and the Laboratory Data Sharing and Interoperability Project (LDSI), which allows DoD to act as a reference lab for chemistry tests performed for the VA. VA orders are entered electronically in CPRS and are transferred to CHCS via a secure VPN connection; results are returned electronically to VA. Turnaround times are much quicker and patient safety is enhanced because manual entry of the results into CPRS is eliminated. The LDSI application is currently unidirectional and is being enhanced to support the bi-directional exchange of orders and results between VA and DoD, so that each agency can serve as a reference lab for the other.

Another collaborative project is the DoD/VA Consolidated Mail-out Pharmacy (CMOP) Interface. In this project, military beneficiaries treated at Naval Base Coronado, Naval Air Station, San Diego, California, and Kirtland Air Force Base, Albuquerque, New Mexico, can choose to have their outpatient prescriptions filled by the CMOP at Fort Leavenworth, Kansas, and mailed to them rather than having to wait and pick up prescriptions at the pharmacies in the military treatment facility. The VA fills an average of 8,000 orders and 10,000 prescriptions per week for the two military treatment facilities.

VA and DoD are currently developing a final architecture for the electronic interface between the agencies' health information systems. We also have implemented a joint project management structure that includes a single Program Manager from VA and a single Deputy Program Manager from DoD. This structure ensures joint accountability and day-to-day responsibility for project implementation. Developing the technology to support the exchange patient health care data and the creation of an electronic medical record for both veterans and active duty personnel is a priority for VA. We believe that the plan being pursued, although challenging and complex, will provide the necessary flexibility while achieving the desired interface between VA and DOD.

VA and DoD are optimistic that as a result of the improved collaboration between the two departments in these joint IT initiatives, both will be better positioned to evaluate health problems among service members after they leave military service, veterans, and shared beneficiary patients; to address short—and long-term post-deployment health questions; and to document any changes in health status that may be relevant for determining disability.

VistA-Lite

As a physician, I have seen first-hand the benefits of electronic health records in VHA: immediate access to information, elimination of duplicate orders, increased patient safety, improved information-sharing, more advanced tracking and reporting tools, and reduced costs. CPRS has been enhanced and refined continuously since its initial implementation, and has been recognized by IOM and in the mainstream press as one of the most sophisticated EHR systems in the world. Although VistA and CPRS were developed specifically to support the VA model of care, they were designed with flexibility and adaptability in mind. As VA has shifted its focus from inpatient, institutional care to an ambulatory, primary care model in recent years, we have updated and enhanced our information systems to support different care settings, adding new "smart" software features, incorporating new technologies, and developing better methods of coordinating data from multiple sites. In fact, VA's EHR was altered for use in both DoD and Indian Health Service. By the mid 1990's the three largest federal systems providing direct health care were using derivatives of VA's EHR, although only VA was using the current and more robust version including CPRS.

VistA and CPRS are in the public domain. They have been adopted for use in the District of Columbia's Department of Health, American Samoa, and several state health departments and state veterans homes. A number of countries, including

Germany, Finland, Great Britain, Mexico, and Ireland, have either implemented VistA or expressed an interest in acquiring the technology.

VHA is now working with the Centers for Medicare and Medicaid Services (CMS) to make the benefits of electronic health records available to other providers. VA and CMS are collaborating on the development of a "VistA-Lite" version of VA's VistA system. VistA-Lite will be designed specifically for use in clinics and physician offices. In developing VistA-Lite, VHA and CMS hope to stimulate the broader adoption and effective use of electronic health records by making a robust, flexible EHR product available in the public domain.

VistA-Lite will be based on VistA, but will be streamlined and enhanced to make it appropriate and affordable for use outside VA. For example, patient registration features of VistA will be modified to reflect the requirements of smaller medical practices. Specialty components, such as OB/GYN and Pediatrics, will be enhanced. The VistA operating environment will be streamlined so that installation and maintenance are simplified. Vista-Lite can be adopted directly by physician offices, used by vendors who provide administrative support services to physician offices, or used by commercial software developers to make competitively-priced products with similar functionality. Private developers, physician organizations, and health care purchasers have been made aware of the VistA-Lite project and the response has been favorable.

The VistA-Lite project is co-managed by CMS and VHA, and is coordinated with other federal agencies, including the Indian Health Service, Health Resources and Services Administration, the Centers for Disease Control (CDC), and the Food and Drug Administration (FDA). The project is funded by CMS. The first version of the VistA-Lite system is expected to be available in November. Subsequent releases will reflect changes and improvements made to the core VistA system and will be developed in conjunction with participating agencies.

Many providers and communities are eager to use EHR technology, but don't know where to start. For providers who have not used an EHR before, it is difficult to determine which capabilities are needed in a particular setting. To assist health organizations in the comparison and selection of EHRs, Health Level Seven (HL7â), an international standards development organization, has established an industry-wide initiative to define a set of standard functions for electronic health records, and to recommend the high-level, care-related functions appropriate for different care settings. VHA worked with HHS to commission the development of the standard, and a VHA nurse informaticist co-chairs the HL7â EHR Special Interest Group, which manages this initiative.

The HL7â EHR standard is intended to set the benchmark for electronic health records, through broad public—and private-sector participation and consensus on required EHR functionality. This approach promotes a common industry EHR focus, but allows sufficient latitude for commercial product differentiation, fostering competition and innovation among developers of EHR systems. The HL7â EHR model will enable HHS and others to qualify EHR systems in terms of completeness and readiness for adoption.

Personal Health Records and My HealtheVet

The development of personal health records is another area of focus in health information technology. Personal health records are an adjunct to the electronic health records used in a clinical setting, providing patients a secure means of maintaining copies of their medical records and other personal health information they deem important. Information in a personal health record is the property of the patient; it is the patient who controls what information is stored and what information is accessible by others. Personal health records enable patients to consolidate information from multiple providers without having to track down, compile, and carry around copies of paper records. By simplifying the collection and maintenance of health information, personal health records encourage patients to become more involved in the health care decisions that affect them.

Last year, VHA responded to more than 1 million requests from veterans for paper copies of their health information. Such requests are processed through Release of Information offices at VA Medical Centers. As the use of personal computers among veterans has increased, so has the interest in electronic access to medical information.

The VHA My Health*e*Vet project was conceived as a way to help veterans manage their personal health data. My Health*e*Vet is a secure, web-based personal health record system designed to provide veterans key parts of their VHA health record and to let them enter, view, and update their own health information. Patients who take over-the-counter medications or herbs, or who monitor their own blood pres-

sure, blood glucose, or weight, for example, can enter this information in their personal health records.

The implications of My Health*e*Vet are far-reaching. Clinicians will be able to communicate and collaborate with veterans much more easily. With My Health*e*Vet, veterans are able to consolidate and monitor their own health records and share this information with non-VA clinicians and others involved in their care. Patients who take a more active role in their health care have been found to have improved clinical outcomes and treatment adherence, as well as increased satisfaction with their care.

The first version of My Health*e*Vet, released last fall, includes a library of information on medical conditions, medications, health news, and preventive health. Veterans will be able to use the system to explore health topics, research diseases and conditions, learn about veteran-specific conditions, understand medication and treatment options, assess and improve their wellness, view seasonal health reminders, and more. Subsequent releases will provide additional capabilities, enabling veterans to request prescription refills on-line, view upcoming appointments, and see co-payment balances.

In the future, veterans will be able to request and maintain a copy of key portions of their health records from VistA and to grant authority to view that information to family members, veterans' service officers, and VA and non-VA clinicians involved in their care. VA is also working with DoD and other partner organizations to develop a longitudinal health record that will incorporate information from DoD, VA, and private-sector health providers from whom the veteran has sought care.

Summary

In announcing his plan to transform health care through the use of information technology, the President noted our country's long and distinguished history of innovation—as well as our failure to use health information technology consistently as an *integral* part of medical care in America. Health care is often compared unfavorably to other professions and industries in its use of information technology. Grocery stores, for example, are frequently mentioned as being "more automated" than hospitals. At first, this seems outrageous, yet it is not really surprising—treating patients is far more complex than grocery shopping.

We clearly have a long way to go in optimizing our use of information technology in health care; yet, we are not starting from scratch. Electronic health records, personal health records, data and communication standards, and sophisticated analytical tools—the building blocks of a comprehensive, national health information infrastructure—have already been implemented in some communities and settings and are maturing quickly. Our challenge is to create a technology infrastructure that will revolutionize health care without interfering with the human interaction between physicians and patients that is at the core of the art of medicine.

The President recognized America's medical professionals and the skill they have shown in providing high-quality health care despite our reliance on an outdated, paper-based system. At VHA, we know that the support of clinicians is essential to the successful implementation of electronic health records and new IT tools. Clinicians, while often the greatest proponents of health information technology, can also be the greatest critics. At VHA, physicians, nurses, and other providers are actively involved in defining requirements and business rules for systems, prioritizing enhancements, and conducting end-user testing. This involvement increases user acceptance, minimizes disruption during upgrades, and most importantly, enables us to tailor systems to the needs of the health care community.

In VHA, the electronic health record is no longer a novelty—it is accepted as a standard tool in the provision of health care. Our focus is now moving from technical implementation issues to those involving data quality, content, standardization, and greater interaction with other providers and systems. As VHA refines and expands its use of information technology, we look forward to sharing our systems and expertise with our partners throughout the health care community to support the President's plan for transforming health care—and the health of our veterans.

Mr. Chairman, this completes my statement. I will now be happy to answer any questions that you or other members of the Subcommittee might have.

Madam Chair, this completes my statement at this time. I would like to give a brief demonstration of the VA EHR. On the lap top next to me, I actually have a copy of the complete VistA system running on the laptop.

[Demonstration.]

It is not only the operating system and the complete medical record but also the imaging record, as you will see very shortly. We would log on to the system. In a normal system, we would have password protection. We then have, on the front sheet, any alerts that are specific for patients that I am responsible for. I can choose a patient, and then a cover sheet is opened which provides me a quick summary of a patient with lots of information where I can drilldown, for example, for information on their medications or allergies or other items.

I can also look at vital signs and very quickly can go ahead and see a graph of their blood pressure over time, and very often, we go ahead and turn the terminal to the patient and talk with them about either changes in their blood pressure or in their weight. Now, the information that I have here is actually real patient data. We have scrambled the identifying information to protect privacy, but the data that you will see here is real clinical data.

Mr. Madliff is a patient who came to see us. One other thing that I want to show is that we use this chart so you have tabs across the bottom of the screen, so it looks like the chart doctors are used to using within the medical center. Many of our medical centers already are essentially paperless because they don't need to pull the paper chart because all the information is at the finger tips of the providers.

In this case, I am going to look at the laboratory results from Mr. Madliff. In looking at a complete blood count, we will open that up, get all the results, and then go ahead and grab his results. What I want to look at in particular is Mr. Madliff's hematocrit or his red blood count. What you see here are some dramatic drops in a very short period of time. What these represent are severe bleeding episodes. If we look very carefully, we can go ahead and expand this area and see that, in fact, there are a lot of results in a short time that probably occurred with an inpatient hospitalization. We see a gradual drop followed by a rapid rise. Those represent transfusions of blood cells because of the anemia that Mr. Madliff had.

In order to find out what was going on and how we could help him, we took Mr. Madliff to have a colonoscopy because, very often, a gastro-intestinal (GI) bleed is a very common cause, and in fact, we can capture the picture that shows that Mr. Madliff had diverticulitis. On another particular image that was captured during the colonoscopy, we actually see there is actual bleeding in the colon. So, this gentleman did, in fact, have a GI bleed. In order to diagnosis where that bleed was, we often do bleeding studies or bleeding scans. So, this is an example where the patient was injected with some dye, and then we looked to see where bleeding is.

This was done several years ago, and this was a film that was taken. Our providers put it up to the light box, couldn't find where the bleeding was, so an industrious physicians assistant took it over and scanned it to what was then a new imaging system. Brought it up. Once they had it up, they were able to go ahead and zoom in on it and change some of the backgrounds so they could look at different parts of the x-ray. Out here in the periphery, they saw something that looked a little bit suspicious. By reversing it, they were able to see an area out here that was a fuzzy area and

that represented the area of the bleed. So, they were able to locate very quickly, using this automated system, where the bleed was.

Let me go ahead and show you one other patient so I will change to a different patient, in this case Mr. Green. Mr. Green has a different problem, which is to be expected. If we look at the progress notes, we see that there is a cardiology note that was made. We can open up that cardiology note, and there is the text note but, along with that, a number of images are open. In this case, it represents cardiac catheterizations, and we can in fact see the cardiac catheterization of Mr. Green. We can show him here is an area that represents why you are having chest pain, this narrowing of the coronary artery.

Following that, we can actually continue with the procedure and, using a coronary angiography, can actually show the balloon in his coronary artery, but more importantly, when it is all done, we can go ahead and look at what was the result of the procedure, including that the area that was once constricted is wide open. Obviously, showing this to the patient, being able to turn and say, "Here it is, you did have this problem, here is how we treated it, now we have taken care of the acute problem, now we need you to take your medicine and to follow a better diet and we will be working closely with you."

This then, as you can see, is an alternative to what we normally have which is a set of charts. In this case, we have five charts. The average in VA is 2.5 charts. Some of the patients with chronic conditions can actually have a ton of charts. Trying to find a particular blood count in this is almost impossible. Trying to see a pattern so you can see the two or three episodes of bleeds is obviously impossible, except for the way we usually do it in medicine which is we get a medical student to go through the chart and by hand manually graph the results. So, that ends my demonstration. I will be available now for any questions that you might have.

Chairman JOHNSON. Certainly is dramatic to see how you can track information from year to year and visit to visit in a way that you simply couldn't if you had to go back and pull that all out of a paper record. When you are able to show a patient such a change in their status, do they take their medicine more regularly thereafter? Do you have any research that shows greater compliance because they understand the problem better and what was done?

Dr. KOLODNER. We have a number of things that we are doing. In particular, rather than being able to isolate whether the patient is more compliant by showing them their data, we have the decision support and the reminders that are part of helping us to practice better care. The table that I showed a little bit earlier, has that result on these various indicators having to do with beta blockers after heart attacks, the rate of pneumo vacs, or vaccine. In fact, for the pneumo vacs vaccine, our rate now is 90 percent. That sounds pretty good until you then also add we have about a 9-percent refusal rate. So, we have essentially either immunized or gotten a refusal from all the patients who should be receiving pneumo vacs in the VA. By using the reminders and getting them even more engaged with personal health records, we think that that will make it an even more beneficial factor for our veterans.

Chairman JOHNSON. Thank you. That was very interesting. Dr. Brailer, I wanted to pursue this issue of the national perspective on this issue, what is meant by a national health information infrastructure, just kind of as a starting point. The witnesses on our second panel, they will attest to the fact that, currently, there are a number of very innovative projects going on in the private sector that expand the use of IT, in one case in Indianapolis, in another case in a system, Kaiser. As entities are developing such systems independently and demonstrating the power of them, what is your role and what is the relationship between these independent actions and the development of a national health information infrastructure?

Dr. BRAILER. Thanks for the question. I think we have multiple roles to play. First, you are seeing the early adopters, communities, States, regions, who, for reasons of their own leadership, the market that they have, various other factors are moving ahead of many other regions. I think our role with them is to be supportive and, honestly, to learn from them so we can take the lessons that they have, incorporate them into policy and do research and advice for other regions.

As we think about the mainstream of America, I think we can't rely on this early adopter effect to take us where we need to go. Therefore, I see really three types of roles that we need to play: first, to provide the Federal actions that can support these local communities, and that could include looking at our rules, our regulations, our other policies to ensure that they are able to do what they are doing. An example is the change that was released in the MMA that created the waiver to the Stark amendment that allowed community organizations to support investment. There are many other things like that.

Two, these regions need to have seed money, startup funds to be able to work through very complicated business technical privacy issues and to derive many of the factors of support that are needed locally. The grants and other things, money that will be available in the 2005 budget and beyond that, clearly are supportive of that.

Thirdly, there are technologies, there are pieces that are necessary to support regions. Some are local, and some are national. Some of the technologies are available now; some are not. Some are available, but they are not very cost-effective. I see a national role in helping bring together some of the key technologies that are needed to allow a State or a regional area to be able to develop their own infrastructure.

So, in the end, we may not have as clean of a model as Britain, where it is a very hierarchical regionalized system, but I think we will have a Federal role that consists of laws and rules, technology support, and if you would, some of the financial underpinnings and then regions that could vary how they deploy this within some boundaries that have governance in oversight in what they are doing, have technology deployment, and the real human components of helping physicians and other components of the industry, consumers being able to actually make use of these technologies to deliver the results that we want.

Chairman JOHNSON. In some of the areas of the country, the private sector initiatives are very dramatic. They are big. They are

comprehensive. Do you have any concern that they will develop solutions that then are not interoperable?

Dr. BRAILER. Oh, I am very concerned about solutions being developed that are not interoperable. I think, in many ways, today a regional enterprise or a hospital system faces a choice between, do we move forward without complete interoperability, or do we wait on all the ingredients? One of the key factors we have to do is complete the efforts the Secretary started around the Consolidated Healthcare Informatics Initiative efforts to promulgate standards. The effect of any movers waiting on us to promulgate standards is a very negative factor in adoption. Beyond that, these regions have many other barriers that we face, some of which are out of our control to be able to move that forward.

Chairman JOHNSON. Let me just pursue one other question, and we will go back and forth here. To what extent are the pieces out there, like SNOMED and things like that, beginning to build a national structure? What is the timeframe for you and whoever else to come to a conclusion about standards so that we can guarantee that what happens will be interoperable?

Dr. BRAILER. I think we have three stages of standards. We are very late in the first phase. That is to agree on what the standards are. This is standards that exist in paper that we agree on. There is still a large variation in the implementation of those standards. The second phase is to have common references for actual implementations. The companies that build these products actually incorporate software into their product that reference these. Third, is to create the work flow and the actual human factor changes. We have SNOMED as a standard, but if we are not able to incorporate that into the daily work of a physician, we won't capture data that is SNOMED compatible.

I think we are crossing over the last phase with a few more standards and very much approaching the phase of reference implementation and then the phase of adoption into standard practices. I think this can be done, the next phase, in the next year or two at the outside and then overlapping another year or two into the other. So, I would think, in a short number of years, we should be able to be through this standards phase into a very mature, very fully deployed and highly referenced standards effort.

Chairman JOHNSON. Thank you very much. Mr. Stark.

Mr. STARK. I thank the witnesses very much. Let my just start out, this will sound more negative than I hope where we'd end up. In 30 years, I have seen and heard suggested a variety of standardized ideas in terms of either prescribing drugs or hospitals having standardized accounting systems or physicians having standardized patient records. Guess what? We have no agreement 30 years later in how these things should be done.

My guess is that, if I was going to be around here 30 years from now, if we let people just fuss around with that—it seems to me, the last time CMS and the Health Care Financing Administration decided to redesign so we would have a uniform reporting for all the intermediaries, because we had 70 or 80 different computer systems, and guess what, they went out and left contracts with 8 different contractors and none of the new systems could interface with the others. So, what, we went from 70 systems that couldn't

talk to each other to 8 that couldn't talk to each other. That is where my sense is that we are today. I can't quote that, quarrel with that. In many cases, there is a sense of professional pride, I suppose, among individual providers, physicians. There is a sense of entrepreneurial intellectual property, in terms of people who may have certain procedures or ways of operating their businesses or developing their drugs that they don't want anybody else to find out. Many of those things would be reasonable excuses.

I don't think there is any disagreement that, if we don't get some kind of reasonable database outcomes research, we aren't going to make much progress in the ever more technical field of delivering medical care. So, with that, as a background and because we are dealing now in a governmental forum and recognizing that this may prejudice the free market, free enterprise, we did it in physician reimbursement, for better or for worse. The government pays about a third, probably a little more of all the medical care that is delivered in this country. Pretty much directly. I am not including what the States do, but Federal government pays about a third.

When this Committee determined how we would reimburse physicians under Medicare, again, guess what, most of the major insurance companies in the private sector followed suit, applied their own index to it, and it has become, for better or for worse, a standard among major payers. I don't know how much. So, my instinct is to say, this isn't ever going to get any better unless we give Dr. Brailer some legislative authority, which I don't think he has at all, and say, "Doc, in 6 months, you have got to come up with a standardized patient records form."

Then I would follow the question—I would ask my colleague, Dr. Gingrey, if he would get in on this as well—"Is there any reason that any of you physicians couldn't practice medicine based on Dr. Kolodner's system? Maybe you would like it a different way, but is there anything there that would effect the practice of medicine as we know it?"

If we just said that is what it is going to be, there may be better systems but in an effort to get there, to get moving on it, and it may be somebody else's system—we will hear from Kaiser and others today who are trying to do it. If we pick the system and said, now the only way we enforce it is say, "This is how the Federal government intends to pay for Medicaid and Medicare," we can't tell Blue Cross and we can't tell Aetna what to do, but my guess is we would move people toward a standard version. Please, we have some people who are professionals at this. I would ask the two witnesses. Could we do that?

Mr. GINGREY. Representative Stark, you asked me to respond. I appreciate that. I think the answer is, I can't think of any reason why we shouldn't, couldn't do that. I think it would make the practice of medicine much safer, much more efficient. You have already discussed the reasons why and what Dr. Kolodner presented to us here, what they are doing in the VA and, as you pointed out, at the very outset, the MasterCard and Visa card, why you couldn't actually take that information and put it on a little wallet-size card like that so that, not only would it be on a hard drive somewhere or from State to State, but the patient actually could carry it with them. Clearly, I think Representative Stark is correct, that we not

only could do it, but we should do it. I hope it doesn't take 10 years to get there.

Chairman JOHNSON. We opened it up. Mr. Camp.

Mr. STARK. I was going to ask Dr. Brailer how long it has been since you may have practiced, but could you practice with that kind of a gizmo or whatever it is?

Dr. BRAILER. Well, first, it has been 2 years since my last patient contact, but as the father of a 3-year-old, I have patient care for my son frequently.

Mr. STARK. I know the problem.

Dr. BRAILER. I actually used my first electronic medical record when I was a resident and rotated through the VA. It was not a system quite this elegant. I want to say, thanks for improving it, Rob, because the one I used was great but not this good. I think we need to recognize, Congressmen, that the market exists on a broad spectrum. Today, there are physicians who are adopting these tools and using them. There are some who are sitting at the press of this, others who are being more studied and, in the end, others who will go to their deaths without knowing this.

They are doing that for a variety of reasons, many of the ones you described. They are cultural factors. There is fear of technology, although I find that to be really remarkably less than constantly stated. There is something that I think is true with all of this, and that is that one solution that works for those that are sitting on the edge—they really need a little bit of a nudge and some help—is not the solution for those that are sitting with some recalcitrants.

My concern with having kind of a big program that pushes this is we could be quite inefficient with resources for those that don't need a lot of help, and it could be ineffective for the others. That is kind of the core of this. Many physicians who have tried to do this have failed. The failure rate of implementation is quite high. I would be concerned if we pushed or reimbursed our way to physicians doing this that we might increase the failure rate. It is not because of bad technology. It is because this is so intrusive to the workload. My particular concerns are one-man and two-man practices——

Mr. STARK. Take old geezers like me, who come to technology slow, but my kids, who may be doing fourth grade work on the computer, you will get to that point, can learn. It seems to me that, if the system is there, in a way, I guess you could make exceptions for those who choose not to participate at all, but for those who do want to learn, if we allow a multiplicity of systems without any common language and coordination, we won't ever make the change. So, in medical schools, if they all started using the system, and those like you youngsters who like this stuff, and understand it, the nerds of the medical profession, as it were, you guys could pick up on it. Your parents would just have to miss the fun of practicing medicine on the Internet. I don't know. I will give up.

Chairman JOHNSON. Dr. Brailer, I will give you a yes-or-no answer. We have one more person to question. There is the next panel. There is another Subcommittee that starts meeting at 4:00. So, I want everyone to at least hear the testimony. You want to respond briefly.

Dr. BRAILER. I don't know if I can say yes or no to such a detailed and thoughtful question. I would argue this: that there are factors of readiness in practices and in the market that need to be put in place as investment flows. Those factors that might include helping reduce the failure rate of implementation by helping physicians purchase systems that meet their needs, being able to evaluate and certify that products meet the claims that are made so we will be able to know what kinds of products they are, being able to help physicians with implementation, actually changing the way their practice operates so that those tools which tip off these changes don't tip off calamities in terms of negative results. I think these readiness factors need to exist in the milieu where investment from private sector and others is made—that is where we are concentrating on this—that make sure we have multiple pathways.

Mr. CAMP. Thank you Madam Chairman. Dr. Brailer, I appreciate both of your testimony, but my question is, expanding technology for technology's sake is fine, but I am very interested in, obviously, the increase in quality and attempt with that increase in quality to also keep costs down. Obviously, I have seen a lot of the advantages of the new technologies in the medical field because, obviously, with three children, I probably am a three-time user of the health services. It just seems to me that simply technology for technology's sake is not the goal. The goal really ought to be, how does technology increase quality of care and, at the same time, keep costs down. If you could just briefly comment, I would appreciate it.

Dr. BRAILER. Thanks for the question. I think that is one of the core issues. We are leaving a phase where there has been an enlightenment with technology but forgetfulness about why it is important. Just to summarize a few key points. There is very good evidence that IT, when used in hospitals and physicians offices can deliver the kinds of results that Dr. Kolodner described consistently. Those results include reducing errors, being able to comply with evidence that is stated and accepted as the normal practice, being able to improve preventative care. That evidence, I think, is overwhelming to the point where I would take the view that we usually think of IT as a form of therapy, that it is not different than perhaps giving drugs or doing other things because it does consistently lead to that result when used correctly. The issue is how to make sure that it is used correctly.

Its ability to save money comes from the evidence that it can reduce inappropriate care or non-value-added care or change the overall environment of chronic care management in the industry where each physician in their practice or each hospital is not able to render longitudinal services. So, I am quite optimistic about that and think the record is relatively strong in both academic science and in field experience, which is why I think we are here at the fore, being able to push this forward.

Chairman JOHNSON. Thank you. Thank you both. This discussion was very useful because I think, as you say, Dr. Brailer, this completely changes the way an office works and also the way it thinks about its work. So, it is very important that we provide assistance, and as the two of you leave, because we really want to get on to the other panel—and thank you, Dr. Kolodner, for that

excellent—I had no idea actually that it could integrate the information from so many years of charting and allow to you go deeper into x-rays like that. That is excellent.

I think this so profoundly changes the way an office looks at health information and its relationship to the patient. It is very important that, not only we look at this issue, what is it costing, where do we get the money, because so far, some of the change is being funded by either health plans who could afford to invest or the government. I think we have to take seriously, what does it cost?

The thing that hasn't been discussed that I think is just as serious is what kind of support do you give two—or three-man practices or two—or three-women practices to help them learn how to use this and be there periodically when they are having trouble. Because we see, over and over again, those difficulties in our own offices as we have to make systems change.

Thank you very much for being with us. I will move on to the other panel so that all Members will be able to hear all the testimony. Then we will move on to questions in the second panel. Dr. Safran; Janet Marchibroda of eHealth Initiative; Marc Overhage; and Andrew Weisenthal, Dr. Weisenthal of Kaiser Permanente. We will start with Dr. Safran, the President of American Medical Informatics Association of Bethesda, Maryland. Dr. Safran.

STATEMENT OF CHARLES SAFRAN, M.D., PRESIDENT, AMERICAN MEDICAL INFORMATICS ASSOCIATION, BETHESDA, MARYLAND

Dr. SAFRAN. Chairman Johnson, Ranking Member Stark, Members of the Subcommittee on Health, thank you for your leadership and for the opportunity to appear before you today. These are very promising times for the widespread application of IT to improve the quality of health care while also reducing costs. In my comments, I especially want to note the importance of the resource that is most often underutilized in our approach to information systems: our patients.

My name is Charles Safran, I address you today as the President of the American Medical Informatics Association, the association of physicians and nurses and health professionals that has long been the primary force in the innovative use of IT in health care. We are focused on linking the fields of health IT with its users, health care professionals and its ultimate beneficiaries, our patients. I am a primary care physician on the faculty of Harvard Medical School. I am also CEO of Clinician Support Technology (CST), a small business developing Internet-based collaborative health care to empower consumers to be more effective participants in their own care.

Health care is information-intensive, and billions of dollars have already been spent on health information systems. All too often, the result has been digital islands of data that have not provided real benefit for clinicians and their patients. By contrast to the usual fragmented department-by-department approach to information management, a few integrated, highly functional clinical computing systems have emerged.

In 1993, the American Medical Informatics Association termed these systems patient-centered. What distinguishes these systems was that patient care, not cost accounting or billing, was the mission. The systems were designed for clinicians by clinicians. These systems, in Boston, Indianapolis, Salt Lake City, New York City, Nashville, and elsewhere, are national models for patient safety, e-prescribing, EHRs and community information systems.

There is no question that EHRs improve patient care. There are many studies to prove this, but why has adoption been slow? Why do we rely too much on sneaker wear, asking patients and their families to carry medical records and reports across the boundaries of our fragmented health system? The answers to these questions are complex and include significant constraints of managed care and misaligned physician incentives, but in large measure, it is people and policies that have created the barriers, not technology. I would argue, informed people, especially informed patients, and enlightened policies can overcome these barriers.

CST Baby Care Link, which I helped to develop, is an Internet technology that empowers parents to participate in the care of a sick child which, in turn, improves care and lowers costs. Baby Care Link is designed for parents who may never have used the Internet. It delivers just-in-time information to help patients navigate complex health care systems.

In a recent report to the State of Colorado, which funds Baby Care Link through a public-private partnership with the generous support of Johnson & Johnson, parents who frequently use Baby Care Link took their infants home from the neonatal intensive care units 2 weeks sooner than families who were less frequent users. The benefit from Medicaid's parents was even greater. At Stroger Cook County Hospital, Baby Care Link has literally stepped over the digital divide, providing new tools for clinicians and their parents to communicate, collaborate, and coordinate the care of fragile newborns.

I want to bring up four areas of focus where I think this Committee and our government can have some impact. First, we need to train a new generation of physicians, nurses, and health professionals to lead the development, selection, and implementation of patient-centered health information-systems. We should require accreditation of informatics training programs just as we required the accreditation of other clinical specialties. Second, government can help foster a more open and efficient marketplace by funding an independent national resource containing research evaluations and business outcomes related to health IT. Simply, it is a database of what works and what doesn't work. Third, we need to make the availability of IT a priority for underserved populations to improve communication and coordination of their care needs. We should not use the digital divide as an excuse for avoiding the hardest health care problems.

Last, we should turn our focus from the hospital and the physicians office toward the home. While good hospital information systems and EHRs are a necessity, I believe that the personal health record, a lifelong electronic repository of health information controlled by the patient, will make a key evolutionary step toward a new health paradigm that is truly patient-centered.

In our country, patients are the most underutilized resource, and they have the most at stake. They want to be involved, and they can be involved. Their participation will lead to better medical outcomes at lower cost with dramatically higher patient and customer satisfaction. We should remember that the real goal of improved health information systems is not better hospitals or better physician practices but better quality of care and healthier citizens. Thank you for allowing me to speak today. I will be happy to answer questions.

[The prepared statement of Dr. Safran follows:]

Statement of Charles Safran, M.D., President, American Medical Informatics Association, Bethesda, Maryland

Chairman Johnson, Ranking Member Stark, members of the Health subcommittee: thank you for the opportunity to appear before you today. These are exciting and very promising times for the widespread application of information technology to improve the quality of healthcare delivery, while also reducing costs, but there is much yet to do, and in my comments I want to note especially the importance of the resource that is most often under-utilized in our information systems—our patients.

My name is Charles Safran. I address you today as President of the American Medical Informatics Association—AMIA—the association of physicians, nurses and health professionals that has long been a primary force in the innovative use of information technology in healthcare. We are especially focused on linking the field of health information technology with its users—health care professionals—and its ultimate beneficiaries, our patients. I am a primary care physician on the faculty of Harvard Medical School and on the staff of the Beth Israel Deaconess Medical Center. I am also CEO of Clinician Support Technology, a small business developing Internet-based Collaborative Healthware to empower consumers to be more effective participants in their own care.

Healthcare is information intensive, and hospitals in the United States have spent billions of dollars to computerize everything from the billing office to the laboratory, pharmacy and radiology departments. But too often the result has been hospitals with digital islands of data. Today when a health system announces a $100 million 5-year information technology implementation plan all too often it is talking about replacing data systems that can't talk to each other—and that have not provided real benefits to clinicians or their patients.

Let me mention one example of the impact of information systems that keep clinical data in separate silos. A well-known hospital implemented a physician order-entry system with considerable fanfare—which within weeks resulted in a physician revolt and the firing of the CIO. The order-entry system was state-of-the-art, but it failed at one high volume, clinically critical moment—when a patient was admitted from the emergency room. It turns out that the ER departmental system did not talk to the hospital admitting system. Patients needed to be re-registered in the hospital system, a process that could take 30 minutes to one hour. To a clinician, an hour delay in writing a critical care order was simply unacceptable.

By contrast to the usually fragmented department by department approach to information management, some hospitals, like the Beth Israel Deaconess Medical Center in Boston, LDS Hospital in Salt Lake City, Columbia Presbyterian Hospital in NYC, and Vanderbilt Hospital in Nashville, have had highly integrated and functional clinical computing systems for decades. In 1993, the American Medical Informatics Association termed these systems Patient-Centered. What distinguished these information systems was that patient care—not cost accounting or billing—was the primary mission, and the systems were designed by clinicians for clinicians. In a Patient-Centered system, data is entered once and shared many times. When a patient is admitted to the hospital from the ER in one of these health systems, a single keystroke moves his or her clinical information to the caregivers who need to have it, when they need to have it. The National Library of Medicine supported the specialized training of the physicians, nurses, and health professionals who run these systems, and the Agency for Healthcare Research and Quality (and its predecessors) have supported their evolution and unbiased evaluation. Today these systems provide replicable models for the effective use of information technologies for patient safety, e-prescribing, electronic health records, and community information networks.

There is no question that electronic health records improve patient care. There are numerous scientific studies that prove it. But most physicians do not have electronic health records (EHR) in their private offices—Why? Even in a city like Boston where most of the hospitals have Patient-Centered information systems and many physicians do have EHRs, citywide connectivity and interoperability are the exception rather than the rule. These hospitals and physician offices could securely exchange patient data across the street or across town (or across the world for that matter), but they don't—Why? Why do we still rely far too much on "sneakerware", asking patients and their families to carry medical records and reports across the boundaries of our fragmented health system? The answers to these questions are complex—and are influenced by factors ranging from the significant time constraints of managed care to misaligned financial incentives that reward episodic care rather than the quality of care delivered—but in large measure it is people and policies that have created the barriers, not technology. And, I would argue, informed people—especially, informed patients—and enlightened policies can overcome the barriers.

For each of us, healthcare is a local experience. Healthcare well delivered is not about procedures or sophisticated technologies; it is about communication, coordination and collaboration between a patient, their family, and their care team. This circle of care revolves around the home and community, not the hospital. Most physicians practice outside the hospital and most of your constituents spend very little time in the hospital. The decision to seek medical care is made in the home and hence we need to provide healthcare in the home. Telemedicine, literally "care at a distance", is not a futuristic idea, but is routinely practiced by Dr. Michael Kienzle and his team in Iowa as they care for elderly throughout their state with the "Clinic in Every Home." In Wisconsin, Dr. Patricia Brennan and her team routinely link with post hospitalization patient with the Internet-based HeartCare program. Similar programs of eHealth or "cybermedicine" as Professor Warner Slack at Harvard likes to call it are underway in many states.

CST® Baby CareLink, which I helped develop, is Internet technology that empowers parents to participate the care of the sick child—which in turn improves care and lowers costs. Baby CareLink, now running in eight states in 13 different health systems, is specifically designed for a parent who may never have used a computer or the Internet before. Written at a 6th grade reading level in English and Spanish, Baby CareLink delivers just-in-time information to help a parent navigate our complex healthcare system. In a recent report to the State of Colorado, which funds Baby CareLink through a public-private partnership with the very generous support of Johnson & Johnson, parents who frequently used the Baby CareLink took their infants home from neonatal intensive care units two weeks sooner than families who were less frequent users. The benefit for Medicaid parents was even greater, with even earlier discharges and greater potential costs savings. At Stroger Cook County Hospital, Baby CareLink has literally stepped over the digital divide, providing new tools for clinicians and their patients to communicate, collaborate and coordinate the care of fragile newborns. We had been told repeatedly that poor people will not use the Internet, but what we discovered is that motivated parents, regardless of economic status, eagerly use interactive tools that are appropriately written and presented. In fact, interactive tools written with low reading and health literacy in mind are clearly better educational investments than printed materials. Wouldn't the millions of dollars a year we spend on printing brochures that we know are ineffective be better spent on innovative children's health related information technology?

Consumerism is coming to healthcare, as it has to almost every other industry. A huge sea-change is beginning in healthcare. The Internet has unleashed information and health-related online communities are flourishing. But, Americans and their physicians and nurses remain largely disconnected. Over 40% of families that we surveyed at the Jimmy Fund clinic in Boston found the phone method of communicating with their care team inadequate; over 40% of your constituents say they want to email their physicians. Yet, only 5 to 10% of American physicians agree to respond to email from their patients. Why hasn't consumer demand forced change in the healthcare market? Part of the problem is that at the ATM machine the transaction is easy to quantify and understand, but in the physician's office the outcomes of good (and bad) communications are intensely personal.

Let me conclude with four areas that I think government can focus on and support to help promote innovative uses of information technologies, and the long-term health of our citizens.

First, we need to train a new generation of physicians, nurses, and health professionals to lead the development, selection and implementation of patient-centered health information systems. These professionals, trained at the university level in

applied clinical informatics, will transform the clinical IT landscape. In Boston, the CIO's of the two largest health systems, John Glaser, PhD at Partners Healthcare and John Halamka, MD at CareGroup, as well as Daniel Nigrin, MD at the Children's Hospital, are all products of NLM funded post doctoral training programs in informatics. We should require the accreditation of informatics training programs, just as we require the accreditation of any other clinical specialty.

Second, we need an unbiased and up-to-date clearinghouse of products and implementation strategies to inform health systems and physicians about health IT options. Even as Dr. Brailer, in his role as National Health Information Technology Coordinator, and the Commission on Systemic Interoperability chartered under the Medicare Modernization Act are facilitating the absolutely critical development and dissemination of agreed-upon standards for health IT systems, government—through the AHRQ, the NLM or another mechanism—can help foster a more open and efficient marketplace by funding an independent national resource containing research, evaluations and business outcomes relating to the wide range of health IT choices available today. Simply, a database of what 'works' and doesn't work would be invaluable in helping direct future health care IT investments by hospitals and physicians, and someday even consumers.

Third, we need to make the availability of information technology a priority for underserved populations to improve communication and coordination of their health care needs. We should not use the digital divide as an excuse for avoiding the hardest health care problems. Our experience with Baby CareLink suggests that even modest support of appropriately designed Internet-based information systems that can provide the information that patients and their families really need can result in significant improvements in health care quality, even as it reduces costs.

Lastly, we should turn our focus from the hospital and physician office into the home. While good hospital information systems and electronic health records are a necessity, I believe that the personal health record, a lifelong electronic repository of health information controlled by the patient, will be the key evolutionary step towards a new health paradigm that is truly Patient Centered.

In our country, patients are the most under-utilized resource, and they have the most at stake. They want to be involved and they can be involved. Their participation will lead to better medical outcomes at lower costs with dramatically higher patient/customer satisfaction. We should remember that the real goal of improved health information systems is not better hospitals or better physician practices, but better quality of health care and healthier consumers.

Thank you for allowing me to speak with you today. I will be happy to answer any questions.

Chairman JOHNSON. Thank you very much. Ms. Marchibroda.

STATEMENT OF JANET MARCHIBRODA, CHIEF EXECUTIVE OFFICER, EHEALTH INITIATIVE

Ms. MARCHIBRODA. Madam Chairman Johnson, Congressman Stark, distinguished Members of the Subcommittee, I am honored to be here today to testify before you on the role of IT in improving quality, safety, and efficiency in health care. My name is Janet Marchibroda. I am testifying today on behalf of the eHealth Initiative and serve as its CEO. I am also Executive Director of the Foundation for eHealth Initiative. Both are Washington, D.C.-based, national nonprofit organizations whose missions are the same: to improve the quality, safety, and efficiency of health care through information and IT. I also serve as the Executive Director of Connecting for Health, a public-private sector collaborative funded and led by the Markle and Robert Wood Johnson Foundations that is designed to address the barriers to the development of an interconnected electronic health information infrastructure.

There is a looming health care crisis in our country. As Americans, we are faced with, as we know, an aging population, health care cost increases, dissatisfied clinicians abandoning the practice

of medicine, a shortage of nurses, rising numbers of uninsured, and baby boomers demanding greater accountability. We are at a place where there is a crisis requiring a new kind of thinking about how we should manage and deliver health care. The evidence is clear and compelling that the way we delivered care before will not fit the world as it is now, and we have to become more efficient and effective, and IT can play a critical role in addressing these challenges.

Right now, as we have heard from the other folks that have testified, the health care system is highly fragmented, with information stored in a variety of formats which in most cases are not connected. In an electronic information age when vital data can be transferred electronically at the speed of light, only a fraction of health care data is accessed and transferred digitally. More than 90 percent of our estimated 30 billion health care transactions in the United States each year are still conducted by phone, fax, or mail. As a result, the information that is needed to support the care of patients is not available when it is needed and where it is needed to support both clinical decisionmaking and patients as they navigate our health care system.

There is now clear and compelling evidence that IT will indeed help to improve quality, safety, and efficiency, and those statistics are outlined in detail in my written testimony. Despite evidence of the quality, safety, and efficiency improvements that can be achieved through the use of IT, adoption rates continue to be low. In our discussions with many hospitals, clinicians, plans, employers in the health care system, the following have emerged as the key barriers to adoption.

First of all, the lack of standards and interoperable systems. While some gains could be achieved by putting EHRs in every clinician's office, we won't truly recognize the value unless they are interoperable and interconnected. Number two. The need for up front funding for those who really need help, and a misalignment of incentives. That was number two. Number three. Organizational change within the clinician's office. Four, the need for leadership both within government and in the private sector.

There is a great deal of work that is going on across both the public and private sectors to tackle each of these barriers. Many groups have made great strides including in the Federal government, the Consolidated Health Informatics Initiative, and the National Committee on Vital and Health Statistics in the standards arena. In the MMA in particular, the standards requirements in the electronic prescription program, and also the standards requirements in the Medicare management performance demonstrations will help to spur adoption of data standards.

In addition, in order to buildupon the current momentum, activities should continue on the current trajectory, and the Federal Government should continue to play its strong role in data standards. In addition, demonstration projects should be constructed ideally through public-private sector partnerships to test and evaluate standards related to data, technical architecture, and security so that lessons learned and various tools and resources can be shared with other communities across the country who are adopting IT and emerging health information exchange.

Second, with regard to misalignment of incentives and funding, our 50 million health IT grant program received an unprecedented amount of interest from hundreds and hundreds of health care stakeholders interested in technology-related projects. The eHealth Initiatives Connecting Communities for Better Health program conducted in cooperation with Health Resources and Services Administration (HRSA), which is providing seed funding to multi-stakeholder collaboratives within communities revealed that 134 communities across America in 42 States and the District of Columbia had pulled together stakeholders from at least 3 stakeholder groups, and they have matched funding already and they were seeking additional funding. I think there is a real opportunity for the public and private sectors to work together to facilitate this change across our country.

Finally, as it relates to alignment of incentives, I think that the MMA and the chronic care provisions related thereto offer an excellent opportunity to support movement toward an electronic health care system by leveraging and rewarding those applications that, at the same time, build a health information infrastructure.

In conclusion, health care IT holds great promise for helping our Nation address its health care challenges, but there are many barriers to adoption, including those related to leadership, financing, standards, and organizational change. We at the eHealth Initiative are committed to working with the public and private sectors to tackle these barriers.

Madam Chairman Johnson, Congressman Stark, distinguished Members of the Subcommittee, thank you for inviting me to discuss our perspectives on the role of IT. We commend you and your Committee for the work that you have done to improve the quality, safety, and efficiency of health care for patients through IT for all Americans. Thank you.

[The prepared statement of Ms. Marchibroda follows:]

Statement of Janet Marchibroda, Chief Executive Officer, eHealth Initiative

Madame Chairwoman Johnson, Congressman Stark, distinguished members of the Subcommittee, I am honored to be here today to testify before you on the role of information technology in improving quality, safety and efficiency in healthcare. My name is Janet Marchibroda. I am testifying today on behalf of the eHealth Initiative and serve as its Chief Executive Officer. I am also Executive Director of the Foundation for eHealth Initiative. Both are Washington, D.C.-based national non-profit organizations whose missions are the same: to improve the quality, safety and efficiency of health and healthcare through information and information technology. The eHealth Initiative's membership includes clinicians, employers, health plans, healthcare IT suppliers, hospitals and other healthcare providers, consumer groups, pharmaceutical and medical device manufacturers, public health organizations, standards bodies, and academic institutions that have interests in improving healthcare through information technology. I also serve as the Executive Director of Connecting for Health, a public-private sector collaborative established by the Markle Foundation which receives additional funding and support from the Robert Wood Johnson Foundation that is designed to address the barriers to development of an interconnected health information infrastructure.

In my remarks today, I will share some information and observations about what we believe are the key challenges to improving healthcare in America, information technology's role in addressing those challenges, the current state of the healthcare system as it relates to information technology adoption, the key barriers the system is facing in achieving progress, and strategies that both the public and private sectors can employ to promote the usage of information technology to support better health and healthcare.

Challenges Within the U.S. Healthcare System

There is a looming healthcare crisis in our country. As Americans we are faced with an aging population, healthcare cost increases, dissatisfied clinicians abandoning the practice of medicine, a shortage of nurses, access problems created by lack of health insurance coverage, and baby boomers demanding greater accountability.

By 2030, one in five Americans will be over 65 years of age, consuming a larger portion of our healthcare resources. And with rising healthcare costs continuing to drive up health insurance premiums (2002 premium increases averaged 12.7 percent), healthcare purchasers are finding themselves choosing between wage increases or higher subsidies for health insurance. The rate of healthcare inflation is at an all-time 12-year high, at eight times the general inflation rate.

Clinicians also are facing rising insurance premiums, but of another sort: malpractice rates. Many are leaving medical practice due to escalating premiums and the increasing challenges of an overly complicated healthcare system. And clinicians are not the only ones in the healthcare sector facing challenges. Nurses are becoming scarcer, with a current shortfall of approximately 400,000 nurses nationwide. Thirty states had a shortage of registered nurses in 2000, and 44 states and the District of Columbia are expected to have a shortage in 2020.

Access problems are further complicated by those lacking appropriate healthcare coverage. Today, 15.8 percent of the U.S. population is not covered by health insurance. This leaves close to 44 million Americans without financial coverage for major medical emergencies and access to needed medical care on an ongoing basis.

The Institute of Medicine (IOM) and other highly regarded organizations have published a great deal of information regarding the patient safety challenges currently experienced in our healthcare system. According to the IOM, medical errors in hospitals kill an estimated 44,000 to 98,000 people per year—more than those that die in motor vehicle accidents (43,458), or from breast cancer (42,297). Adverse events occur in up to 3.7 percent of hospitalizations, with up to 13.6 percent of them leading to death.[1] Studies show that adverse drug events occur in 5 to 18 percent of ambulatory patients.[2] In a 2001 Robert Wood Johnson survey, 95 percent of doctors, 89 percent of nurses and 82 percent of healthcare executives said that they have witnessed serious medical errors. Forty-seven percent of patients surveyed in 2000 by AHRQ and the Kaiser Family Foundation say they are concerned about experiencing a medical error. In many cases, physicians do not know what drugs a patient is currently taking because of the lack of information technology and connectivity.

There are also opportunities for improvement in the quality of care that is delivered. A June 26, 2003 report in the *New England Journal of Medicine* documents the appropriateness of treatment for 7,528 adults. Their research revealed that American adults, on average, receive only a little more than half (54.9 percent) of the healthcare measures recommended for their conditions—and the lead author pointed to the need for "a major overhaul of our current health information systems" as a key step to fix the problem.[3]

Finally, in addition to challenges in the healthcare delivery system, the U.S. is experiencing challenges in the public health system. Recent threats including those related to SARS and West Nile Virus, as well as the terrorist acts of September 11, 2001 underscore the vital significance of disease surveillance in protecting the public from natural and unnatural outbreaks.

As Americans we are at a place where there is a real social, political and economic crisis requiring a new kind of thinking about how we should manage and deliver healthcare. The evidence is clear and compelling that the way we delivered care before will not fit the way the world is now. We have to become more efficient and effective, and information technology can play a critical role in addressing these challenges.

The Role of Information Technology in Addressing Healthcare Challenges

According to the IOM's report—Crossing the Quality Chasm, "If we want safer, higher quality care, we will need to have redesigned systems of care, including the use of information technology to support clinical and administrative processes—the

[1] To Err Is Human: Building a Safer Health System, Institute of Medicine, 2000.

[2] Leape LL, Bates DW, Cullen DJ, Cooper J, Demonaco HJ, Gallivan T, et al. Systems analysis of adverse drug events. ADE Prevention Study Group. *JAMA*. 1995;274: 35–43.

[3] From a June 26, 2003 report in USA Today, "50/50 chance of proper health care," by Rita Rubin.

current care systems cannot do the job. Trying harder will not work. Changing systems of care will."

The U.S. healthcare system, representing approximately $1.4 trillion or 14 percent of the nation's gross domestic product, is highly fragmented, with information stored in a variety of formats (often paper-based) which in most cases are not connected. Each healthcare entity, public and private—clinicians, hospitals, insurers, researchers—gathers and holds its own information, most often in paper form. In an electronic information age when vital data can be transferred electronically at the speed of light, only a fraction of healthcare data is accessed and transferred digitally. More than 90 percent of the estimated 30 billion healthcare transactions in the United States each year are still conducted by phone, fax or mail.[4]

As a result, the information that is needed to support the care of patients is not available when it is needed and where it is needed to support both clinical decision-making and patients as they navigate our complicated healthcare system. The absence of readily available, comprehensive, patient-centric health information and ready access to clinical knowledge negatively affects healthcare at every level.

Clinicians sometimes are forced to approach patient care with incomplete information about a patient and without point-of-care access to the multitude of clinical decision support guidelines that are available to guide them. The volume and complexity of these guidelines is growing so fast that they cannot be accessed effectively without the use of information technology. As a result, clinicians may unnecessarily repeat tests, call for unnecessary hospital stays, or advise ineffective (or sometimes dangerous) treatments. Research shows that physicians spend and estimated 20% to 30% of their time searching and organizing information. And in fact, today, 10 to 81 percent of the time, physicians do not find patient information they need in a paper-based medical record.[5] This can lead to duplication of lab tests and other medical services, delays in treatment, and the increased risk of medication errors.

In addition, researchers and public health officials do not have ready access to aggregate data to track diseases or measure the effectiveness of treatments. Patients cannot easily view their own health records or transfer their own health information from clinician to clinician. Businesses cannot measure the effectiveness of clinicians or health systems in delivering safe, quality care.

There is now clear and compelling evidence that information technology will indeed help to improve the quality, safety and efficiency of our Nation's healthcare system.

A recent study from the Center for Information Technology Leadership indicates that we can achieve $44 billion in savings annually in reduced medication, radiology, laboratory, and hospitalization expenditures from 100 percent adoption of Computerized Provider Order Entry (CPOE) in the ambulatory care environment. A more recent study indicates that standardized healthcare information exchange among healthcare IT systems would deliver national savings of $86.8 billion annually after full implementation and would result in significant direct financial benefits for providers and other stakeholders.

According to the CITL CPOE data, more than two million adverse drug events and 190,000 hospitalizations per year could be prevented using IT.[6] Further, evidence from Brigham & Women's Hospital concluded that through use of CPOE, error rates were reduced by 55 percent, from 10.7 to 4.9 per 1,000 patient days.[7] A recent study of intensive care patients by Kaiser Permanente found that when physicians used a CPOE system, incidents of allergic drug reactions and excessive drug dosages dropped by 75 percent, and the average time spent in the intensive care unit dropped from 4.9 days to 2.7 days, reducing costs by 25 percent.[8]

Current Levels of Information Technology Adoption

Despite evidence of the quality, safety and efficiency improvements that can be achieved through the use of information technology, adoption rates continue to be low. More than 90 percent of the estimated 30 billion health transactions each year are conducted by phone, fax or mail.[9] Forty percent of surveyed healthcare organizations planned to spend 1.5 percent or less of their total operating budgets last year

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[4] Michael Menduno, "apothecary.now," Hospitals and Health Networks, July 1999, 35–36.

[5] Clinical Information: Achieving the Vision, 2002; Kaiser Permanente.

[6] The Value of Computerized Provider Order Entry in Ambulatory Settings, Center for Information Technology Leadership, 2003.

[7] Bates et al., JAMA, October 1998.

[8] *Clinical Information: Achieving the Vision, 2002;* Kaiser Permanente.

[9] Michael Menduno, "apothecary.now," Hospitals and Health Networks, July 1999, 35–36.

on IT, and 36 percent set spending at 2 to 4 percent.[10] This compares to an average IT investment of 8.5 percent in other industries.[11]

It appears that the organizations and individuals who are taking the lead in the adoption of information technology are the ones who truly believe that healthcare information technology can save money and improve healthcare quality, safety and efficiency as well as those who have been able to offset those investments through grant programs. Those who have been the slowest adopters are those who have had limited access to capital, and those who have not had ongoing financial incentives to support their adoption.

On the individual practitioner level, only 5 to 10 percent of physicians use electronic medical records in their practices. And in the electronic prescribing area—some research shows that less than 5 percent of U.S. physicians currently "write" prescriptions electronically.[12]

At the facility level, while 13 to 15 percent of hospitals have implemented some form of computerized medication order entry, physicians in these organizations enter less than 25 percent of their orders using the system.[13]

Demand is Emerging from Clinicians and Consumers

It is clear that demand for information technology adoption is now emerging from clinicians and consumers. Recent activities related to information technology by groups such as the American Academy of Family Physicians, the American College of Physicians, and the American Medical Association serve as a signal of this increased interest. In fact, a recent Medical Group Management Association (MGMA) study indicates that 22.8 percent of respondents thought that use of the electronic medical record (EMR) would result in decreased costs, and 31 percent believed it would increase patient satisfaction.

There is also increasing consumer demand for electronic tools that will support navigation of the healthcare system. A study by Jupiter Media Metrix showed that 54 percent of consumers were willing to "switch" to a physician who would use e-mail to schedule appointments, renew prescriptions, answer treatment questions and check lab reports. A 2003 Foundation for Accountability (FACCT) survey conducted as part of Connecting for Health found that over 70 percent of consumers surveyed believed a personal health record would improve quality of care. When respondents were asked about having health information online, 71 percent said it would clarify doctor instructions, 65 percent said it would prevent medical mistakes, 60 percent said it would change the way they manage their health and 54 percent said it would improve quality of care.[14]

Barriers to Information Technology Adoption

In discussions with stakeholders across the healthcare system, including clinicians, hospitals, health plans, employers and healthcare information technology suppliers—the following have emerged as the key barriers to adoption:

- *Lack of Standards and Interoperable Systems.* The lack of interoperable systems and data standards has often been cited as a key barrier to adoption. According to a 2002 survey conducted by the Medical Records Institute, clinicians across a variety of settings identified "difficulty in finding an electronic medical record solution that is not fragmented over several vendors or IT platforms" as a top barrier.[15] While some gains could be achieved through the adoption of electronic health records across the healthcare system, the real value—particularly within clinician offices—expressed in terms of quality, safety, and efficiency will only be achieved if such systems are interoperable and electronic connectivity is achieved, so that clinicians have key information—such as that related to laboratory tests and prescriptions—when and where it is needed—at the point of care.
- *Lack of Upfront Funding and Misalignment of Incentives.* Practicing clinicians, hospitals and other healthcare providers often cite the lack of upfront funding and business models to support ongoing usage as key barriers to adoption. In addition, emerging research indicates that there is a misalignment between

[10] An info-tech disconnect, Modern Healthcare, February 10, 2003.
[11] InformationWeek Research's Evolving IT Priorities 2002 and 2003.
[12] "A call to Action: Eliminate Handwritten Prescriptions Within 3 Years!" Institute for Safe Medical Practices. http://www.ismp.org/msaarticles/whitepaper.html.
[13] American Society of Health-System Pharmacists Study.
[14] Connecting for Health. The Personal Health Working Group Final Report: July 2003, p. 5.
[15] The Medical Records Institute and SNOMED. Fourth Annual MRI Survey of Electronic Health Record Trends and Usage. 2002.

those who pay for the implementation and ongoing usage of information technology and those who benefit from its usage. Under the current healthcare system, benefits related to the gains in quality, safety, and efficiency are spread across all stakeholders while the real costs are borne by only a few. Incentives must be realigned to facilitate the exchange and sharing of data and information across and between organization, institutions, providers, and payers. In a survey of provider CEOs, 25 percent cited lack of financial support as a barrier, while 17 percent cited the need to provide quantifiable benefits or return on investment as the greatest barrier.[16] A recent survey of 5,000 family physicians conducted by the American Academy of Family Physicians found that 60.5 percent cited affordability as a barrier to adopting electronic medical records.

- *Organizational Change Issues.* A recent survey of 5,000 family physicians conducted by the American Academy of Family Physicians found that 54.2 percent cited worries about slower workflow or lower productivity.[17] This has been confirmed through several meetings and discussions with practicing clinicians across the country.
- *Need for Leadership.* In order to drive transformational change, leadership is needed from both the public sector—both at the federal and state level—and every segment of the private sector—including clinicians, hospitals, laboratories, payers, employers and other healthcare purchasers, manufacturers of pharmaceutical and medical devices, public health agencies, and those who build and implement information technology.

Public and Private Sector Strategies for Addressing Barriers

There is a great deal of work going on in both the public and private sectors to overcome the barriers identified above to drive improvements in the quality, safety and efficiency through the use of information technology but clearly more work still needs to be done.

The eHealth Initiative and its Foundation and key initiatives such as Connecting for Health, have taken an active role in advancing the development and implementation of policies and practical strategies by key stakeholders across the healthcare system to promote a healthcare system that mobilizes information to support patients through electronic connectivity and the use of standards-based, interoperable information systems. The following summarizes key steps taken by our organization, the public sector and several other private sector organizations that are moving us towards an interoperable, electronic healthcare system.

Standards and Interoperable Systems

Many influential groups have made great strides in both the development and adoption of standards to support a higher quality, safer and more efficient healthcare system enabled by information technology. Within government, the Consolidated Health Informatics Initiative has played an integral role in gaining consensus on the data standards that the Federal government will use in its own operations. The National Committee on Vital and Health Statistics has played a critical role by providing ongoing advice and counsel to the Secretary of the Department of Health and Human Services regarding the standards that should be adopted to promote an interoperable, electronic healthcare system.

Through Connecting for Health, a public-private sector collaborative in which the Foundation for eHealth Initiative is involved, leaders across every sector of healthcare achieved consensus on a first set of data standards that should be adopted by our healthcare system, which played a considerable role in moving this work forward. Connecting for Health is extending this work further in its second phase, through the development of recommendations which address technical architecture, applications and standards to support electronic connectivity and IT adoption.

The eHealth Initiative and its Foundation have played an integral role in promoting standards adoption. Through our Public-Private Sector Collaborative for Public Health, we developed strategies and practices for transmitting data electronically—using standards—to support public health surveillance processes. Our Connecting Communities for Better Health Program, conducted in cooperation with with the U.S. Health Resources and Services Administration (HRSA) is providing seed funding to nine multi-stakeholder collaboratives within communities across the country who are using IT and mobilizing information across institutions to support quality, safety, efficiency and public health goals within their regions. One of the

[16] Healthcare Information and Management Systems Society and Superior Consultant Company, 14th Annual HIMSS Leadership Survey. 2003.
[17] Ibid.

key criteria for selection was the usage of standards in electronic data transmission conducted as part of the project. These projects will be announced to the public over the next month.

The *Medicare Prescription Drug, Improvement and Modernization Act of 2003* (MMA) provides critical provisions that will promote the adoption of data standards, including the standards requirements included in both the electronic prescription program and the "Medicare Care Management Performance Demonstration" as well as the creation of the Commission on System Interoperability which will develop a comprehensive strategy, timelines and priorities for the adoption and implementation of healthcare information technology standards. In addition to the MMA, H.R. 2915, the National Health Information Infrastructure Act of 2003 also provides critical provisions that will facilitate the adoption of standards to promote interoperability. The eHealth Initiative supports this bill and commends Chairwoman Johnson for her leadership.

In order to build upon the current momentum for standards development and more importantly—adoption of existing standards, activity should continue on the current trajectory. The Federal Government should continue to play a strong role in the development and adoption of standards within its own programs. It should provide incentives to the private sector to promote the usage of such standards, and it should work closely with the private sector in establishing consensus on the standards that should be adopted.

To accelerate the adoption of information technology adoption and an interoperable healthcare system, demonstration projects should be conducted—ideally through public-private sector partnerships—to test and evaluate standards and specifications related to data, technical architecture, applications and security—so that lessons learned and various tools and resources can be shared with other communities across the country who are adopting information technology and engaging in health information exchange activities.

Lack of Upfront Funding and Misalignment of Incentives

Progress on addressing the second key barrier—financing—has lagged behind the significant work around data standards and interoperable systems, despite the demand from both healthcare communities and stakeholders across the country.

The Agency for Healthcare Research and Quality's $50 million Health Information Technology grant program received an unprecedented amount of interest from hundreds and hundreds of providers and other healthcare stakeholders interested in grant funding to support both planning and implementation of information technology-related projects. In response to a request for proposal sent out by the Foundation for eHealth Initiative as part of its Connecting Communities for Better Health program conducted in cooperation with HRSA, proposals came in from 134 communities representing 42 states plus the District of Columbia, who were interested in implementing information technology and sharing clinical data electronically across at least three stakeholder groups, and who had secured matched funding to support this work. The response from both of these programs indicates that communities across America, and the healthcare leaders who reside within them, are ready to move towards an interoperable, electronic healthcare system, but will need help in getting there. Our dialogue with several of these communities indicates that, while the creation of these programs has stimulated a great deal of interest and in many cases, has created the impetus for a multi-stakeholder consortium of leaders to take this work forward—that efforts will be hampered by the lack of capital required to get this work off the ground.

A small number of pilot projects are emerging that are driven by both employer-purchasers and health plans that provide incentives to clinicians, hospitals and other healthcare providers who are using information technology to deliver higher quality healthcare. The Bridges to Excellence Program is one example of an initiative that is developing and evaluating reimbursement models that encourage the recognition of healthcare providers who demonstrate that they have implemented comprehensive solutions in the management of patients and deliver safe, timely, effective, efficient, equitable and patient-centered care which is based on adherence to quality guidelines and outcomes achievement. Adoption of health information technology, with special emphasis on fully functional electronic medical record systems, equipped with electronic prescribing modules and robust clinical decision support, is being targeted for rewards. Physician practices will be able to earn up to $20,000 per physician per practice for adopting these systems.

In addition, the MMA provisions related to a "Medicare Care Management Performance Demonstration" in Section 649, offer a valuable set of learning laboratories for testing and evaluating the impact of providing information technology to physicians on quality, safety and efficiency. It is imperative that these demonstrations

be closely coordinated with private sector initiatives such as Bridges to Excellence, where possible, to coordinate market experiments.

Finally, the chronic care provisions included in the MMA offer an excellent opportunity to support movement towards an electronic healthcare system by rewarding those applications that leverage integrative information infrastructures, new applications of information and communication technologies, expert clinical systems that incorporate evidence-based guidelines for multiple conditions, and predictive modeling capabilities to support their operations.

In order to continue to move towards an electronic health information infrastructure and the adoption of health information technology, it is critical that policy options that both align incentives and provide federal investment be developed and implemented. These activities will not only accelerate movement, they will also serve to stimulate private sector innovation and investment in these activities. Current and emerging Federal programs should be leveraged to test and evaluate these policy options.

Organizational Change

A number of initiatives have emerged—primarily in the private sector—to address organizational change issues and facilitate the migration towards an interoperable, electronic healthcare system. Successful adoption of electronic application depends upon the ease and speed with which the clinician can use it, as much as the value that it provides for quality, safety, and cost. It is affected by a number of factors including how well the system supports the specific workflows present within a clinician's office, and the specific features that the system provides to improve speed and efficiency. While the effective implementation of information technology ultimately improves outcomes and results in efficiency gains, migrating to a new system takes time and resources, and achieving full return on investment takes time. Because of the changes in care delivery and clinical care processes that are necessary in order to migrate towards the use of electronic systems, the provision of financial and other incentives designed to promote their usage are critical.

To provide support to providers who are undergoing this transition, organizations such as AMIA and HIMSS are developing resources and educational materials that will help clinicians, hospitals and other healthcare providers effectively implement information systems. In addition, the eHealth Initiative and its Foundation have contributed to the field in two key areas. Through our Electronic Prescribing Initiative, the eHealth Initiative engaged more than 70 national experts and key stakeholders across every sector of healthcare and the prescribing chain to develop design, implementation and incentives recommendations that will facilitate the effective and rapid adoption of electronic prescribing in the ambulatory environment. Representatives from hospitals, clinician groups, healthcare IT suppliers, patient and consumer organizations, federal and state agencies, pharmaceutical manufacturing organizations, pharmacy benefits management organizations, health plans, pharmacies, and connectivity providers reached consensus on a set of recommendations related to the levels of electronic prescribing and the benefits that accrue at each level as well as detailed recommendations related usability, clinical decision support, communication, standards and vocabularies, implementation, and incentives.

Through the *Connecting Communities for Better Health Program* the Foundation for eHealth Initiative is obtaining critical input from experts, "on-the-ground" implementers, and other key stakeholders to develop resources and tools related to technical, financial, organizational, and clinical challenge areas related to health information technology adoption and the mobilization of information across organizations. These resources and tools are being disseminated through our *Community Learning Network and Resource Center* and meetings such as the June 2004 *Connecting Communities Learning Forum and Resource Exhibition*, both of which provide both a learning network and a resource to enable communities and healthcare stakeholders to learn from national experts and each other, strategies for addressing the challenges related to implementation of IT and a health information infrastructure.

Private sector organizations will and should continue to emerge to assist healthcare stakeholders as they migrate towards an electronic healthcare system. The Federal government can play a critical role by leveraging the work being conducted by private sector organizations and collaborations in this area. This is also an area that would benefit from public-private sector collaboration.

Leadership

A number of key actions taken by both the public and private sectors have signaled a significant increase in the level of leadership around healthcare information technology issues.

President Bush's recent executive order, which establishes the National Health Information Technology Coordinator position and calls on Federal leaders—within ninety days—to provide options to provide incentives to promote adoption of interoperable health information technology will play a critical role in helping to spur adoption of information technology within the healthcare system. The work of Dr. David Brailer—the new National Health Information Technology Coordinator—including that which is related to developing and implementing a strategic plan; advancing standards through collaboration with the private sector and evaluating benefits and costs of IT—will also be very important to stimulate cooperation within the public sector and collaboration related to these issues across both the public and private sectors.

Connecting for Health, a public-private sector collaborative has also taken several steps to move us towards an interoperable healthcare system, including gaining consensus among diverse stakeholders across both the public and private sectors on an initial set of "adoption-ready" data standards; developing a high-level value proposition for interoperability and a framework for migration; and identifying the high-level characteristics of the personal health record and survey on consumer attitudes. Over the next month, an incremental Roadmap for achieving electronic connectivity will be released by Connecting for Health which is designed to articulate the near-term actions that should be undertaken by both the public and private sectors to get to an electronic health information infrastructure. In addition, over the next few months, several recommendations which have been vetted by both the public and private sectors, which address a wide range of issues related to adoption of interoperable information systems will be released.

Conclusion

In conclusion, healthcare information technology holds great promise for helping our Nation address its healthcare challenges. Evidence has shown that the effective implementation of information technology and the mobilization of information across organizations can result in significant improvements in healthcare quality, safety and efficiency and can also serve to protect and improve public health.

But there are many barriers to the adoption of information technology and electronic connectivity, including those related to leadership, financing, standards and organizational change. It is imperative that we build upon the work being conducted by both the public and private sectors and the public-private sector partnerships that have emerged—to continue to drive the change that it necessary to help us achieve our vision of an electronic healthcare system that will lead to better health and healthcare for all Americans.

Madame Chairwoman Johnson, Congressman Stark, distinguished members of the Subcommittee, thank you again for inviting me to discuss our perspectives on the role of information technology in addressing our healthcare challenges, the barriers that impede its adoption, and the strategies that can be employed to overcome these barriers. We at the eHealth Initiative are committed to working with both the public and private sectors to make our vision of an improved healthcare system enabled by information technology and electronic connectivity a reality. We commend you and your Committee for the work that you have done to improve the quality, safety and efficiency of healthcare for patients through information technology. Your introduction of H.R. 2915, to accelerate the creation of a National Health Information Infrastructure, along with the inclusion of several important information technology provisions in the *Medicare Prescription Drug, Improvement and Modernization Act of 2003* (MMA), and of course this hearing today all serve to improve our nation's healthcare system through information technology. Again, thank you for this opportunity and I look forward to answering any questions you may have.

Chairman JOHNSON. Thank you very much. Dr. Overhage.

STATEMENT OF J. MARC OVERHAGE, M.D., PH.D., ASSOCIATE PROFESSOR OF MEDICINE, REGENSTREIF INSTITUTE, INDIANA UNIVERSITY, SCHOOL OF MEDICINE, INDIANAPOLIS, INDIANA

Dr. OVERHAGE. Good afternoon. My name is J. Marc Overhage, and I am an Associate Professor of Medicine at the Indiana University School of Medicine, and a Senior Investigator at the Regenstrief Institute. I also serve on the Board of Directors of the American Medical Informatics Association and the leadership governance of the eHealth Initiative. Primarily, I am a practicing general internist, a doctor for adults.

I am here today to testify regarding our experience in developing a regional health information exchange in order to help the Committee understand how we created our exchange, and then to suggest ways in which the government may be able to help other communities do the same. The region where we have developed our health information exchange is central Indiana which, with a population of 1.6 million, is representative of other urban centers, and the health care delivery system there faces all of the challenges of which you are all acutely aware.

The Regenstrief Institute is a not-for-profit medical research organization created in 1969, and is dedicated to the improvement of health through research that enhances the quality and cost effectiveness of health care. Thirty years ago, Clem McDonald began creating the Regenstrief Medical Records System, with three simple goals: first, to eliminate the logistical problems associated with the paper record; second, to standardize the care process to deliver information in a more organized and useful way; and, third, to analyze and understand the data to improve the health of populations.

Beginning a decade ago with grant funding from the National Library of Medicine and the AHRQ, Dr. McDonald and I began to create and evaluate a regional health information exchange. We extended the functionality of the Regenstrief medical records system to include methods for matching patients without requiring a common identifying number, for standardizing how the systems represent the clinical information regardless of which organization generated the data, for combining the standardized clinical data into useful and acceptable fashions for care delivery, along with appropriate access controls and auditing to protect the privacy of the patients' data. In a pilot study, we showed very promising results, and on the strength of those results we were able to convince a larger number of organizations to participate in the collaboration that emerged and we now call the Indiana Network for Patient Care (INPC).

This system allows providers, in compliance with the Health Insurance Portability and Accountability Act 1996 (P.L. 104–191) privacy and security regulations, to obtain essential clinical data almost instantly from participating organizations. We have built a technology that supports the INPC on established clinical information standards, including the HL7 messages that define the format for exchanging data and Logical Observation Identifiers Names and Codes (LOINC) that identify laboratory tests. While standards continue to evolve, the INPC is proof that current standards are sufficient to move forward.

We use a common web-based interface and single sign-on to simplify access for physicians. However, as you are well aware, today, only a small proportion of physician practices use any type of electronic health information systems in their practice. In order to address this problem, we have created an innovative tool called DOCS4DOCS to introduce a basic level of clinical information system utilization into physician practices.

Perhaps most importantly, the DOCS4DOCS system provides services built around the health information and exchange that are sufficiently valuable that participants are willing to pay for them. The clinical messaging service which delivers results from hospitals, radiology centers, and other providers to physicians' offices in Indianapolis provides operating efficiencies to those organizations and allows the providers to receive the results in a reliable and efficient and uniform fashion.

The ultimate measure of our success will be the creation of a sustainable funding model for the health information exchange. We have made substantial progress by creating the Indiana Health Information Exchange, which is a not-for-profit 509(A)3 corporation that supports the first commercial services built on the health information exchange. Hospitals and other data providers who utilize the clinical messaging service pay for this service, receive a good return on their investment, and help underwrite and support the costs of the infrastructure for the other services.

We have recently completed a multi-year study in which all of these hospitals sharing data with each other, and will be able to share the results of that study soon. When we asked care providers, though, how the health information exchange has helped them, they readily recall anecdotes. For example, one woman who was waiting to be seen in her provider's office suddenly collapsed. Her provider was able to identify her and retrieve her medical records within a few moments, and this allowed them to view her past medical history, medications, and allergies, providing them with information when the patient could not. It changed the decisions they were planning to make, and helped to take better care of this patient. In this case, the INPC acted as the patient's voice, speaking for her when she could not.

As another example, a patient came to the emergency department with chest pain, and his providers thought that he was probably having a heart attack. As they were preparing to administer blood thinning medications that would help relieve his symptoms, they discovered through the INPC that the patient had had a head injury within the last 2 weeks, a contraindication of that medication, and perhaps prevented the patient from dying. There are a number of things I think that the government can do to help advance this cause that are detailed in my written testimony. Thank you very much.

[The prepared statement of Dr. Overhage follows:]

Statement of Marc Overhage, M.D., Ph.D., Associate Professor of Medicine, Regenstreif Institute, Indiana University, Indianapolis, Indiana

Good afternoon Mr. Chairman and Members of the Committee. My name is J. Marc Overhage and I am an Associate Professor of medicine at the Indiana University School of Medicine and a Senior Investigator at the Regenstrief Institute but I am also a practicing general internist, a doctor for adults. I am testifying today

to share our experience developing a regional health information exchange in order to help the Committee understand how we created our health information exchange and then to suggest some ways in which the government can help other communities create their own health information exchanges.

The Indianapolis MSA which includes 9 counties in central Indiana with a population of 1,607,486 is the 29th largest in the US. Afro-Americans or blacks account for 13.9% of the population, Asians 1.2% and Hispanics (any race) 2.7%.

There is a long history of successful public—private collaborations in central Indiana. The most recent example is Biocrossroads (www.biocrossroads.com) which is an economic development activity focused on growing Indiana's already formidable life sciences industrial base. We believe that a sustainable health information exchange will be such a public-private collaborative and that the communities familiarity and success with this model will facilitate the process.

Five major hospital systems—Community Hospitals Indianapolis, St. Vincent Hospitals and Health Services, St. Francis Hospital and Health Centers, Clarian Health and Wishard Health Services serve Indianapolis. These five hospital systems operate a total of 11 different hospital facilities and more than 100 geographically distributed clinics and day surgery facilities. Collectively, these systems admit 165,878 patients, and serve more than 390,000 emergency room visits and 2.7 million clinic visits per years.

Regenstrief Medical Record System

The Regenstrief Institute, Inc., (www.regenstrief.org) an internationally recognized informatics and healthcare research organization, is dedicated to the improvement of health through research that enhances the quality and cost-effectiveness of health care. Established in Indianapolis by philanthropist Sam Regenstrief in 1969 on the campus of the Indiana University School of Medicine, the Institute is supported by the Regenstrief Foundation and closely affiliated with the I.U. School of Medicine and the Health and Hospital Corporation of Marion County, Indiana.

Regenstrief Institute investigators have more than 30 years of experience with the capture, maintenance, and retrieval of electronic medical record information. The long-term Regenstrief Medical Record System (RMRS)[i] captures patient information from three hospitals on the Indiana University Medical Center campus and from 30 clinics scattered around the inner city of Indianapolis. At Wishard, where it has been in operation since 1972, the RMRS captures all diagnostic studies (labs, EKGs, cardiac echoes, cytology, surgical pathology, bone marrow biopsies, obstetric ultrasounds, EMG, EEG, radiology studies, etc.) and all orders (including prescriptions) in a coded form. It also captures encounter information and the full text of all dictated reports (operative notes, discharge summaries, visit notes, radiology). The RMRS carries every EKG tracing produced at Wishard for the last 13 years, and every digital radiology image produced at IU/Riley and Wishard since August of 1999, and from Methodist hospital since January 2002. As JPEG compressed (10:1) files, the radiology images from these institutions consume 80 gigabytes per month.

The RMRS also captures clinical data from 8 primary care neighborhood health centers and 27 public health clinics supported by the Marion County Health Department and all four homeless clinics in Indianapolis. In addition, the community and public health clinics can use the RMRS to schedule patients and capture all drugs prescribed and diagnostic tests performed. In each setting, the RMRS augments patient care and facilitates clinical research.

Additional information is added to the RMRS from other sources. From the hospital case abstract tapes the system stores admission and discharge diagnoses, dates, and lengths of stay, and death date for patients who die in the hospital. Death information for all registered patients is obtained from hospital death summaries, autopsy reports, and the Indiana State Department of Health death certificate tapes.

The long-term RMRS at Clarian Health Partnerscontains more than 3 million patients and 420 million computer understandable clinical observations. This information is instantly available for patient management from over 2000 terminals and workstations around the medical center campus. The RMRS is one of the few systems that have captured large amounts of coded patient information from all patient care locations (inpatient, hospital and emergency room). It is also one of the oldest continuously maintained computer medical record systems in the country. Though we have changed programming and file structures three times over 30 years, we

[i] McDonald CJ, Overhage JM, Tierney WM, et. al. The Regenstrief Medical Record System: a quarter century experience. International Journal of Medical Informatics 1999;54:225–253.

have always translated and carried forward the patient data from the old version of the system into the new system. So, we have all clinical data we collected since 1972 in one consistent electronic medical record format. No other EMR system can make that claim.

These data are used heavily for research and management purpose. The Regenstrief Institute employs eight full-time data analysts to answer research and management requests related to this data for a large number of research projects. A recent example of the research value of the database is the report by Marc Rosenman, M.D. who found that IV erythromycin given to newborns was associated with a 10-fold increased risk of pyloric stenosis.[ii]

How we got started

The first across hospital data sharing for clinical care began in Indianapolis in 1993. In that project Wishard Memorial Hospital provided access to its electronic medical record data to emergency department physicians caring for patients in the Community Hospital East and Methodist Hospital emergency rooms in Indianapolis. Building on this experience, all five of the major Indianapolis hospital systems and two large primary care groups joined in the Indiana (previously Indianapolis) Network for Patient Care ("INPC" or "Network") in 1997. All five hospital systems agreed to allow the exchange of patient data for access and use by various Indianapolis health care providers to render emergency and primary care. The primary goals of the INPC are: (1) reduction of the costs of care inefficiencies such as unnecessary repeat testing; (2) increased accuracy of medical diagnoses through common and rapid access to patient information through electronic means; and (3) utilization of the broad-based and ever-growing collection of information on the Network for research purposes related to, among other things, studying the efficacy and cost-reducing effects of broad-based access to patient information and reviewing the information to learn about specific diseases and their treatment.

The National Library of Medicine and the Agency for Healthcare Research and Quality supported the initial development of the INPC through their intramural grant program. The system currently includes data from 13 hospitals in five different hospital systems, the Marion County Health Department (MCHD) and a growing number of physician practices. These hospitals account for over 95% of all beds and ED visits in the Indianapolis MSA. The data collected include demographics, laboratory results, ED, inpatient and outpatient encounter data including free-text chief complaint, coded diagnoses and procedures, vital signs and other data, but not all these data elements are available for every participant. The core set of data currently received from all participants includes demographics, laboratory data, ED and inpatient encounter data including chief complaint, coded diagnoses and coded procedures. The system currently utilizes the real-time laboratory result data for active surveillance of reportable conditions.

The network provides e-mail services, Web access, electronic medical record access, medical library services and numerous special purpose functions (variously) at each institution. It also delivers clinical data to the central RMRS medical record system from a host of different departmental and administrative systems and provides care providers and researchers access to the data. The network provides pathways for interfaces to seven laboratory systems, seven hospital registration systems, four dictation transcription systems, four radiology systems, three pharmacy systems, three different EKG cart systems, two surgery scheduling system, and more than 20 other systems.

Most of the larger interface use standard based HL7 messages. We have standardized the terminology at six organizations so that laboratory tests, radiology results and other patient information are described using the same terms no matter where the data comes from. We use a common interface and one sign-on to link users to independent clinical files at multiple institutions and to other services (such as library knowledge bases). We have developed mechanisms for linking patients registered independently in different institutions and for linking physicians' master files to the state physician identifying databases. Providers can enter clinical orders and visit notes or upload transcribed notes from any device on the network and the system will store them in the appropriate medical record file system.

All INPC participants now deliver registration records, all laboratory tests, and all UB92 records (diagnosis, length of stay, and procedures codes) for hospital admissions and emergency room visits to separate electronic medical record vaults

[ii] Mahon BE, Rosenman MB, Kleiman MB. Maternal and infant use of erythromycin and other macrolide antibiotics as risk factors for infantile hypertrophic pyloric stenosis. J Pediatr. 2001 Sep;139(3):380–4.

maintained on their behalf. The computer system standardizes all clinical data as it arrives at the INPC vault, laboratory test results are mapped to a set of common test codes with standard units of measure, and patients with multiple medical record numbers are linked.[iii, iv] Each institution has the same file structure and shares the same term dictionary which contain the codes, names (and other attributes) for tests, drugs, coded answers, etc. When a patient is seen in any of the 13 emergency rooms operated by participating hospitals, and the patient consents, the information from all of these institutions about one patient can be presented as one virtual medical record.

Patient ID merging

There is no gold standard against which we can compare our patient matching algorithm. We have carried out formal comparisons of matching strategies that suggest our current algorithm has a 90–92% sensitivity and 100% specificity using combinations of social security number, gender, name, and birth date fields.[v] A less scientific but very important measure of how well the matching algorithm works is that we have never had a provider report an erroneous match providing additional evidence that specificity is near 100%.

We certainly miss some matches (sensitivity is less than 100%) and when we do we don't allow the clinician to see the data for the missed match. An error in entering the social security number at one participant, for example, will prevent that registration record from matching with other registration records from the same or different participants for that patient. If the patient is registered in an ED with the correct social security number, the global patient registry will not match the registration record with the erroneous social security number even though all the other data match. The provider caring for the patient has no way to see the "close" matches and cannot access the data for that patient.

Shared Pathology Information Network (SPIN)

With funding from the National Cancer Institute, all of the INPC participants, as well as two new participants (the Indiana State Department of Public Health and their Indiana State Cancer Registry) participate in the Shared Pathology Information Network (SPIN). The hospital participants are adding surgical pathology reports, inpatient pharmacy data, discharge summaries and radiology reports to the data they already provide to INPC. The public health department will contribute de-identified cancer registry data. Many of the hospitals are willing to make this data available for treatment purposes, as long as SPIN protects it well

This NCI project will provide a link from clinical data and outcomes (phenotype) to tissue specimens (genotype), as paraffin blocks in pathology departments. This evolving regional, population-based medical record database provides extraordinary opportunities for epidemiology i.e. clinical and public health research. This project raises many interesting challenges regarding the linking of de-identified records.[vi, vii]

Reports

The INPC system can generate a variety of patient specific and population based reports that facilitate clinical care. There are a variety of triggers for creating these reports including patient encounters and the passage of time. One of the key patient specific reports is the Clinical Abstract. The clinical abstract provides a "one page" summary of specialty appropriate clinical information. The content is specialty specific: a pediatric oriented clinical abstract would summarize growth data and immunization records, an obstetrical abstract would contain data that reflects fetal well being and key dates such as the last menstrual period (LMP) and estimated date of confinement (EDC) and an HIV abstract would feature trends in key laboratory results and details of treatment history.

[iii] Overhage JM, Tierney WM, McDonald CJ. Design and implementation of the Indianapolis Network for Patient Care and Research. Bull Med Libr Assoc. January 1995;83(1):48–56.

[iv] Overhage JM, Dexter PR, Perkins SM, Cordell WH, McGoff J, McGrath R, McDonald CJ. A randomized controlled trial of clinical information shared from another institution. Ann Emerg Med 39(1);14–23, 2002.

[v] Grannis SJ, Overhage JM, McDonald CJ. Analysis of Identifier Performance using a Deterministic Linkage Algorithm. Proc AMIA Symp. 2002; Submitted.

[vi] Grannis SJ, Overhage JM, McDonald CJ. Analysis of Identifier Performance using a Deterministic Linkage Algorithm. 2002 AMIA Fall Symposium (submitted).

[vii] Schadow G, McDonald CJ. Maintaining Patient Privacy in a Large Scale Multi-Institutional Clinical Case Research Network. 2002 AMIA Fall Symposium (submitted).

DOCS4DOCS®

DOCS4DOCS is an innovative tool we have created to introduce a basic level of clinical information system utilization in physician practices. It provides clinical messaging functions—in its simplest form, practices receive various kinds of clinical data and messages from multiple sources; the system aggregates and sorts the data in useful ways and provide printed versions of this data that a physician can review and act on much as they do today. DOCS4DOCS can be used to record when results have been reviewed, for inter and intra office communications and for short to intermediate term storage of these results.

We have deployed DOCS4DOCS to over 800 physicians today with rollout to approximately 600 more planned for this year and 1,600 the following year. The system uses a novel distributed approach to provider identity maintenance. Providers link themselves to the various identifiers used in various source systems (providers may have different and even multiple identifiers in a single hospitals laboratory, transcription and ADT systems for example). Not only does this approach simplify maintenance but puts it in the hands of those who stand to benefit by good maintenance and who know the mappings best.

Perhaps most importantly, DOCS4DOCS provides services built around the health information exchange, that are so valuable that participants are willing to pay for them. The DOCS4DOCS clinical messaging service is replacing, printing, faxing and other delivery methods for the majority of hospitals in Indianapolis providing operating efficiencies to the hospitals and improved functionality to the providers since they receive all of their results in a reliable, timely and uniform manner. Uniformity is very important to the providers because they often receive reports from multiple laboratories and find it difficult to quickly and appropriately interpret them since every hospitals' reports look different. With a consistent format, they are more easily able to identify abnormal results, normal ranges and even which patient the report applies to.

Use of Accepted Medical Informatics Standards

Not only have we used the standards for clinical data exchange and representation that have been endorsed by the federal government's Consolidated Health Informatics Initiative and the Connecting for Health project but we have been major forces in their development. In 1984, the Clem McDonald led an effort that culminated in 1988 with the first clinical message standard. That work was carried into HL7 and today, virtually all clinical system vendors support HL7, and most North American, European, and Pacific Rim health care institutions use the HL7 standard to exchange clinical results. The PI of this proposal wrote most of the HL7 Order Entry and Observation Reporting chapters since its inception in 1987. Gunther Schadow, another RI researcher, has been the major force behind the HL7 Version 3 Reference Information Model (RIM) and the Version 3 Data Types and is a co-chair of the Orders and Observations Subcommittee and Marc Overhage is an HL7 editor and author of several HL7 implementation guides for the CDC.

Regenstrief /IU investigators initiated the development of the Logical Observation Identifier Names and Codes (LOINC™) database that now contains 31,000 standardized codes and names for clinical observations ranging from diastolic blood pressure to serum levels of Hepatitis B surface antigen. Large health care institutions and HMOs (e.g. Partners of Boston, the Veterans Administration, Kaiser Permanente, Aetna Insurance, and large commercial laboratories e.g. Quest and Lab Corp) use LOINC widely. Several countries including Australia, Canada, New Zealand, Switzerland, Germany, Korea, and Hong Kong also use LOINC. The FDA is considering a proposal to require LOINC codes as part of all new drug submissions. The Regenstrief Institute now distributes the LOINC database and RELMA mapping program via a web site at no cost for all commercial and research purposes (http://www.regenstrief.org/loinc).

The Structure of the INPC Agreement

The flow and management of data in INPC is designed to ensure that the use and disclosure of patient information by and among the member providers complies with federal and state law. The participants' agreement on the use and disclosure of patient data is codified in a contract that I will call the INPC Agreement, which is a roadmap for identifying the policy and practical issues that must addressed when sharing health data in a context as large as the INPC. The INPC AGreeement was drafted, reviewed, and approved by clinicians, compliance officers, lawyers, risk managers, and information systems personnel in a cooperative consensus-building process.

How Can the Network and Its Participants Share Health Data to Treat Patients?

Both federal and state laws address the sharing of protected health information ("PHI") between health care providers to treat patients. The Privacy Rule issued pursuant to the Health Insurance Portability and Accountability Act and most state laws generally allow covered entities (health care providers such as hospitals, practice groups, and other organizations) to use and disclose PHI without a patient's consent for "treatment" purposes.

The INPC Agreement is consistent with the permissible uses of PHI for treatment set forth in the Privacy Rule.

The Network is simply a way for the participants to more easily provide PHI to one another, through electronic means, for the treatment of common patients. The INPC allows participants to access Network information submitted by other participants for *any* treatment purpose (in the HIPAA sense) of the accessing participant, regardless of the care setting (*e.g.*, emergency room, inpatient, outpatient surgery, etc.). However, the Network will not release information unless there is verification that a patient is actually in the care setting (such as the exchange of registration information).

The Privacy Rule allows covered entities to engage business associates to perform functions on their behalf that requires the use or disclosure of PHI.

The Regenstrief Institute acts as a common business associate of all of the participants for the purpose of storing and disclosing the participants' PHI to other participants for treatment purposes. The INPC Agreement contains appropriate Privacy Rule business associate provisions.

The INPC Agreement does not require participating hospitals to obtain a patient's consent prior to disclosing the patient's PHI another participant or to Regenstrief for treatment purposes because neither the Privacy Rule nor Indiana state law requires such consent.

Who May Have Access to PHI for Treatment Purposes?

The institutional provider participants must identify the individuals in their organization who may access PHI on the Network. Each institutional participant must certify and warrant that it has taken certain steps to ensure that such individuals will protect the confidentiality of the Network information. Each participant must also ensure that Regenstrief receives regular updates to the institution's authorized personnel list. Participants are also encouraged to identify affiliated physician practice groups who might benefit from access to the Network for patient treatment purposes. However, the institutional participant with whom the physician group is affiliated is responsible for ensuring that the physicians abide by the confidentiality restrictions described in the prior paragraph.

What Information Is To Be Stored on the Network?

The INPC Agreement identifies the information that participants agree to submit to the Network. Without a common agreement that the participants will store minimum categories of information, the Network will not become populated and will not be useful.

The participants agree to make good faith efforts to store, at a minimum, the following kinds of data:

(1) hospitalizations and the emergency room encounter information; and (2) patient demographic information, reason for visit, treating health care provider(s), date of visit, place of visit, diagnoses, procedures, vital signs, all laboratory reports, pathology reports, radiology studies and reports, discharge summaries, operative notes, inpatient medications, cardiology studies, and other diagnostic tests to the extent that participants have the capability to submit such information electronically. Participants are encouraged to make any other clinical information they wish available to the Network.

Consideration must be given to whether a network will accept PHI that is provided extra protection under the law.

Specifically, alcohol and drug abuse treatment records are afforded stringent protection under federal law, and the Privacy Rule gives psychotherapy notes enhanced protection. Accepting such information on a common network will increase the administrative burdens and security measures required to protect such information. The INPC Agreement discourages the submission of drug and alcohol abuse treatment information and prohibits the submission of psychotherapy notes.

How May the PHI Be Used and Disclosed for Research Purposes?

The Regenstrief Insittute and the participants recognize the important opportunities for scientific research provided by the large repository of patient information housed on the Network. Therefore, the Agreement provides for methods of using and disclosing the Network information for research purposes. In all cases, the research provisions of the Privacy Rule are followed. The Agreement sets forth a hierarchy of research uses and disclosures. Use of deidentified health data for research purposes requires minimal approval from the participants whose data will be used. Research that requires the use of identifiable PHI is subject to several approvals, including institutional review board approvals. Given the Privacy Rule's detailed provisions governing the use of PHI for research, the research sections of a network's governing agreement must be carefully drafted so that all parties are comfortable that their data will be used properly. This is a sensitive and complicated area for discussion. In no event does Regenstrief allow information to be disclosed for research projects that has the effect of comparing the participants with one another (such as individual participant outcomes or participant financial information) without the affected participant's approval. This was a particular concern of participants in the highly competitive Indianapolis health care market.

What Are Other Considerations?

Consistency of Data.

Consideration must be given to the format of the information submitted to the Network so that the information is accessible to all participants in a common form. Will the network require the submission of data in a common form, or will the network translate the information into a common form after submission? Under the INPC Agreement, Regenstrief assists participants with the mapping of test results and physicians codes into standard forms that are accessible and understandable by all participants.

Other Uses of Information.

Will other uses of information be allowed. For example, under the INPC, the institutional participants use Regenstrief as their business associate for purposes of screening their health data for communicable disease information that must be reported to the Indiana State Department of Health. Future uses of the information may include screening the information for indicators of bioterrorism activity.

Indemnification.

Given the availability of PHI through the Network that is beyond the physical control of individual participants, the participants required an indemnification provision that protects them in the event that Regenstrief or another participant wrongfully uses or discloses PHI.

Governance.

The Network is governed by a Management Committee. While the INPC Agreement sets forth the structure of the Network, the Management Committee is empowered to make day-to-day operational and policy decisions that are consistent with the structure set forth in the Agreement. Issues addressed include technical issues, confidentiality, the scope of information stored and accessed by participants, and the use of the information. The Management Committee is comprised of representatives of the institutional participants and Regenstrief.

Disposition of Information Upon Termination.

Consideration must be given to the disposition of PHI upon termination of the Agreement or if a participant withdraws. For example, research that relies on the continued availability of the information could be impeded if a participant withdrew and removed its information from the Network. In addition, if information is removed from the Network, the ability of a participant to have access to information to defend itself in malpractice suits could be compromised. Thus, the INPC Agreement makes provision for the extended storage of the information after the termination of the Agreement and after the withdrawal of a participant.

Models of the potential savings from HIE between organizations provide some estimates. One study estimated that uniform data-sharing application nationwide providing easy access to view patients' clinical information would save more than $39 billion—or $11.57 per patient per month. The California Health Care Foundation didn't calculate savings at a national level but estimated net benefits of over $5M

annually for large communities with high penetration of HIE. In a study I participated in the Center for Information Technology Leadership at Partner's Healthcare used a rigorous analytical approach to assess clinical information technologies and disseminates its findings to help provider organizations maximize the value of their IT investments, help technology firms understand how to improve the value proposition of their healthcare products, and inform national healthcare IT policy discussions. They created a financial model that examined the direct value of four levels of interoperability, but the conclusions focused on the financial value of moving to non-standardized, machine-organizable data and standardized, machine-interpretable data (http://www.citl.org/news/HIEI—Findings.pdf). The model did not include any benefits from improved quality or safety of care. CITL found that the value of standardized HIE far exceeds the value of non-standardized HIE. CITL based its model on literature reviews, expert assessments, and market research. To supplement published studies, CITL relies on the informed judgment of its Expert Panel and interviews with IT users, developers, and vendors. The provider centric model included 1,238 nodes. HIEI produces two principal types of benefits: administrative savings and reduced utilization. Administrative savings included the financial value of time saved by transitioning from manual to electronic data exchange Reduced utilization (elimination of redundancy) resulted in economic benefit by eliminating unnecessary lab and radiology tests and improved interoperability between providers and labs, and providers and radiology centers. On a national basis, the model projects $87 billion annual savings with $34 billion value to providers.

In order to explore the implications of the model locally, we reran the model with parameters chosen to represent the Indianapolis MSA. With these parameters, the model predicts net benefits of $3.6 billion over 10 years and an annual net benefit of $500 million in year 10 with providers' net benefits of $1.4 billion over 10 years and an annual net benefit of almost $250 million. These are preliminary findings and require careful review and verification but suggest the order of magnitude of the value of HIE in the Indianapolis MSA. Provider to provider exchange accounted for the largest proportion of the benefit with payor, laboratory and radiology being the next largest.

The ultimate measure of our success will be creation of a sustainable funding model for HIE in central Indiana. We have made substantial progress by creating the Indiana Health Information Exchange (IHIE), a not for profit 509(A)3 not for profit support organization that supports the first commercial service built on the HIE. Hospitals and other data providers in the region are paying fees to deliver clinical results (e.g. laboratory test results, transcribed reports and admission notices) to providers. The IHIE can provide these services at a savings through economies of scale, by eliminating duplicative efforts and by moving results delivery to an electronic platform. If we successfully demonstrate savings from HIE in the ambulatory setting we would create a service through IHIE supported by fees from those who benefit from the exchange.

Benefits to the community

We are still formally evaluating the benefits of health information exchange. We have demonstrated a $26 reduction in charges for each emergency department visit even when only one hospital is sharing data with others. We have completed a much larger study in which all of the hospitals shared data with each other but we have not finished analyzing the results. When we ask care providers how the health information exchange has helped them, they readily recall anecdotes. In one case an ambulance brought a young women to the emergency department unresponsive and data from the INPC allowed her providers to avoid extensive neurological testing and deliver appropriate psychiatric treatment. In another recent episode, a woman was checking into a hospital outpatient clinics when she collapsed. Her providers were able to identify her and bring up her medical record within minutes of her arrival to the department. This allowed them to view her past medical history, medications, allergies—providing us with information when the patient could not. It changed the decisions we were planning to make and helped us take better care of this patient. In this case, the INPC acted as the patient's voice—speaking for her when she could not. A few weeks ago, a colleague of mine, was taking care of a patient with an upper respiratory infection. He had a fever, and cough—but denied any medications or health problems. When the doctor reviewed the patients records, she recognized the patient had HIV and required a different course of treatment. In this case a condition that could normally be treated as an outpatient, required hospitalization and more aggressive treatment. As a final example, a patient came to the ED with chest pain. He was very ill, and not able to tell the doctors his medical history. The physicians were concerned that he was having trouble with his heart, and possibly having a heart attack. A standard treatment for this condition

is give medicine that will thin the blood and allow blood flow back to the injured area of the heart. When the physicians reviewed the data from the INPC they found that a CT scan done at another hospital three weeks previously indicated the patient was recovering from a recent head injury, where giving a blood thinner would have caused increased bleeding and would have injured the patient—possibly resulting in death. These examples illustrate the types of direct patient benefits that health information exchange can provide.

What should the government do

- Development will require a simultaneous top down and bottom up approach. The top down part defines the common approaches; the bottom up builds the collaboration, trust and value proposition.
- Government can facilitate definition of a "path" or "stake in the ground" so that vendors can develop with confidence and providers can purchase with confidence. This "stake in the ground" includes profiles or collections of standards like those endorsed by the government's Consolidated Health Informatics Initiative and the Markle Foundation's Connecting For Health program, definitions of "good enough" security measures and a common approach to authentication.
- Government can encourage use of standard at all levels through, for example, the FDA establishing LOINC® codes for laboratory tests when they are approved and requiring these codes to be included with all printed materials related to the test. Finally, government should participate with other payors in creating mechanisms that use savings generated by health information exchange to offset the costs of infrastructure and the losses that providers suffer as a consequence of improved information flows

I sincerely thank the Committee for this opportunity and would welcome any or all of them to come to Indianapolis and see what we have accomplished first hand.

Chairman JOHNSON. Thank you very much, Dr. Overhage. Dr. Wiesenthal.

STATEMENT OF ANDREW M. WIESENTHAL, M.D., ASSOCIATE EXECUTIVE DIRECTOR, KAISER PERMANENTE

Dr. WIESENTHAL. Madam Chairman, Representative Stark, Members of the Subcommittee, I am honored to be here today to testify before you on health care IT. My name is Dr. Andy Wiesenthal, and I am speaking today on behalf of Kaiser Permanente. I am a pediatric infectious disease specialist by training, and the Associate Executive Director of the Permanente Federation, the National Organization of the Permanente Medical Groups. In this capacity, I co-lead the 10-year, $3 billion effort to implement the comprehensive health care information system throughout Kaiser Permanente.

Seventeen years ago, I was asked to lead the quality improvement program in Kaiser Permanente's Colorado region. I believe then and I believe now that, in order to improve the care that physicians and nurses deliver, they need better and more accessible information. Patients need more ways to relate to the health care system so their needs are effectively addressed.

Finally, if we are to truly assess the quality of care, it is essential to have detailed, automated information about the interactions between practitioners and their patients. All of this requires new ways of collecting, storing, and retrieving health care information. Seventeen years ago, there was really nothing off the shelf that could meet those needs. After trying in my basement to write the software for an electronic medical record myself, I quickly recognized that the scale and complexity of this work required a more

organized, sustained effort. Kaiser Permanente in Colorado eventually invested $55 million in this effort, and implemented its clinical information system in 1998. Fortunately, the state of the art has progressed considerably since I began my effort in 1987.

Five years ago, Kaiser Permanente decided to implement a comprehensive electronic medical record nationally. The term electronic medical record, however, does not capture the broad range of capabilities that Permanente physicians and other Permanente clinicians will have once the system is fully implemented. Kaiser Permanente HealthConnect, as we refer to it, will include a unified electronic medical record for each patient that crosses the spectrum of care from the clinic through the emergency department to the inpatient setting and ultimately the home; inpatient and outpatient clinical decision support, including built-in guidelines and care pathways; a patient billing function, scheduling for patients, physicians, and equipment; broad web-based access, and many other capabilities.

Why did we decide to implement a comprehensive electronic medical record at this time? It was a strategic imperative. To make a major leap forward in terms of quality improvement, service, patient safety, care coordination, efficiency, effectiveness, and job satisfaction, we needed to take the risk. The overriding goal of Kaiser Permanente HealthConnect is quality improvement. Once fully implemented, patient medical information and clinical decision support will be available on a 24 hours-a-day, 7 days-a-week, 365 days-a-year basis, and more than one clinician will be able to use a single patient's information simultaneously. Having the complete medical record available makes it possible for physicians to be aware immediately of all patient issues, test results, history, and concerns, as well as recommendations the patient has received from other clinicians. Clinicians will always be able to work with the most current information and provide the best care and service possible.

Here is a real life example from a Kaiser Permanente Northwest physician: a surgical colleague called me about a patient referred to him with a large mass that he noted on imaging studies. I was able to pull up and look at the Computed Axial Tomography (CAT) scan on my desktop within a minute, and agreed with him that the mass was thyroid-related. I was able to review the patient's symptoms, medical history, and laboratory test results within a minute, and concluded that I should see her to do a thyroid biopsy.

I was able to check my schedule, and because of a recent cancelation, I was able to invite the patient straight over. I saw her within half an hour of being contacted. All of the information I needed was on hand, and a definitive diagnostic test, a fine needle biopsy of the thyroid, was done there and then. In the old days, it would have taken 6 to 24 hours or longer for me to receive the x-ray jacket to look at the hard copy of the CAT scan. I would have needed to gather copies of all labs, prior clinicians' notes, and so forth, from the paper chart. Many times, with urgent consult requests, we did not get the chart in time to review before seeing the patient. This would lead to duplication of testing or, worse, potential failure to recognize important clinical elements that are easy to see with our electronic medical records system.

Now, when a colleague calls with a question, just about the only information they need to provide is the patient name or number, and I can pull up his or her data just about faster than they can tell it to me over the phone. Receiving care for patients should be more convenient. Patients will be able to make the most of care or advice or information via telephone, web, and e-mail, whatever means they choose to fit their needs. Web-based access to results and e-mail messaging will allow each patient to attain greater autonomy in accessing information, and can make it easier for them to send a question or request to their care giver. In the end, benefits to patients in terms of quality, convenience, service, personalized care, costs, and better science are considerable.

While it is still unclear whether in the long run overall spending will decline as a result of implementing Kaiser Permanente HealthConnect, if it just breaks even, the new benefits for patients by any measure are quite considerable. We are pleased that Congress has begun to think about the ways it can enable health plans and health care providers across the spectrum to bring the benefits of health care IT to all patients. The two most prominent ideas being developed relate to standards setting and financial incentives. In my written testimony I discuss in more detail what Congress could do in this area. In closing, I want to congratulate the Subcommittee Chair and the Ranking Member for this timely and important hearing. I would be pleased to answer any questions.

[The prepared statement of Dr. Wiesenthal follows:]

Statement of Andrew M. Wiesenthal, M.D., Associate Executive Director, Kaiser Permanente

Madame Chairwoman, Representative Stark, members of the Subcommittee, I am honored to be here today to testify before you on health care information technology and the promise it has for improving health care quality and patient safety, lowering health care costs, and expanding important research opportunities. My name is Dr. Andrew M. Wiesenthal. I am the Associate Executive Director of the Permanente Federation, the national organization of the Permanente Medical Groups. In this capacity, I co-lead the 10-year, $3 billion effort to put in place, operate and maintain a comprehensive health care information system throughout Kaiser Permanente, one of the nation's leading health plans and its largest private-sector health care delivery system. Kaiser Permanente provides health care coverage and medical care to more than 8.3 million members in nine states and the District of Columbia. The Permanente Medical Groups include more than 12,000 physicians, who are supported by approximately 130,000 professional, clinical, and administrative employees.

In my remarks today, I want to share with you what Kaiser Permanente is doing in the area of health care information technology. I also want to explain why we are doing this—what value we hope this will bring to our members. I will conclude with some suggested actions the Subcommittee may want to consider to speed the adoption of electronic medical records throughout the health care system.

Why Kaiser Permanente is Investing Significantly in an Electronic Medical Record

Seventeen years ago, I was asked to lead the Quality Improvement Program in Kaiser Permanente's Colorado Region. I believed then and I believe now that in order to improve the care that physicians and other clinicians provide, they need better and more accessible information. They need better information on the patients they see, at the time they see them. They need up-to-date information about clinical issues when they make medical decisions. They need better, faster ways to get more reliable feedback on the care they deliver. And patients need more ways to relate to the health care system so that their needs are effectively addressed. Finally, if we are to truly assess the quality of care, it is essential to have detailed, automated information about the interactions between the health care team and the

people for whom they are responsible. All of this requires new ways of collecting, storing and retrieving information.

Seventeen years ago, there was no widely available comprehensive electronic medical record, one containing all the clinical information about a patient recorded over several years by many different physicians, pharmacists, clinical laboratory technicians and others and that can be retrieved instantaneously by any attending clinician with the proper authority to do so. There were crude, general database programs and some rudimentary programs specifically designed for the purpose. But there really was nothing at the time that could meet these straightforward needs.

After trying to write the software for an electronic medical record myself, I quickly recognized that the scale and complexity of this kind of work required a more organized, sustained effort. Kaiser Permanente in Colorado eventually invested $55 million in this effort and implemented its Clinical Information System in 1998. Fortunately, the state of the art has progressed considerably since I began my effort in 1987.

Working to deliver better health care through information technology is a Kaiser Permanente tradition. More than 40 years ago, Dr. Morrie Collen, director of Kaiser Permanente's first research center returned from a national congress on medical electronics convinced that there were ways to use computers to improve health care. Dr. Collen's work eventually led to a 1961 grant from the Public Health Service to study the automation of multiphasic health testing. As a result of this project, KP patients were among the first to see internists armed with computer printouts of pertinent medical data.

Since then, several generations of systems connecting physicians electronically with their patients' medical information have been tested and implemented in different Kaiser Permanente regions. Each regional effort has had its merits. But a more powerful system that would allow seamless communication between physicians regardless of location was needed.

Five years ago, Kaiser Permanente decided to implement a comprehensive electronic medical record throughout its entire system. After several stages of internal development work, we decided one year ago that software developed by Epic Systems of Madison, Wisconsin had evolved to the point that it could handle our size and complexity. Why did we make these decisions? Frankly, we saw them as a strategic imperative. We believed that if we were going to make a major leap in terms of quality improvement, service, patient safety, care coordination, efficiency, effectiveness, and job satisfaction, we needed to take the risk. While we have developed some components of the system ourselves, and others come from an array of vendors, the core of the system we are implementing is from Epic Systems. Similar Epic software has been implemented in many of the nation's largest health care systems. It's my job to direct the implementation at Kaiser Permanente.

Kaiser Permanente's Electronic Medical Record

The term "electronic medical record" does not really capture the broad range of capabilities that Permanente physicians and other Kaiser Permanente clinicians will have available once the system is fully implemented. That's why we have created a more encompassing name to refer to the system—KP HealthConnect. The full range of functions includes:

- A unified electronic medical record for each patient crossing the spectrum of care from the outpatient arena, through the emergency department, to the inpatient setting and ultimately the home.
- Inpatient and outpatient clinical decision support
- Patient billing function
- Patient, physician, and equipment scheduling
- Web-based access for patients and providers (both KP and non-KP)
- Inpatient pharmacy support and reporting
- Clinical laboratory support and reporting
- Emergency department management
- Interfaces to a wide variety of other systems like PACS (picture archiving systems) and population care management systems

The Benefits Kaiser Permanente Expects from KP HealthConnect

The overriding goal of KP HealthConnect is quality improvement. Once fully implemented, patient medical information and clinical decision support will be available on a 24/7/365 basis and more than one clinician will be able to use a single patient's information simultaneously. Internal research from our Colorado Region, where Kaiser Permanente has 420,000 members, shows that electronic medical records are being accessed on average about 1 million times each month. This com-

pares quite remarkably with 90,000 monthly paper chart deliveries before the system was implemented. Having the complete medical record available makes it possible for physicians to be aware immediately of co-morbidities, past visits and patient concerns, as well as recommendations the patient has received from other clinicians. In addition, test results will be immediately available electronically. This means clinicians will always be able to work with the most current information and provide the best service possible.

Nothing illustrates the kind of quality improvement made possible by the implementation of KP HealthConnect than a real-life example. As one physician in Kaiser Permanente's Northwest Region explained:

> A surgical colleague called me about a patient referred to him with a large mass that was noted on imaging studies. I was able to pull up and look at the CT scan on my desktop within a minute and agreed with him that the mass was thyroid related. I was able to review the patient's symptoms, medical history and laboratory test results within a minute, and concluded that I should see her to do a thyroid biopsy. I was able to check my schedule and, because of a recent cancellation, I was able to invite the patient straight over. I saw her within half an hour of being contacted. All of the information I needed was on hand, and the definitive diagnostic test (fine needle biopsy) was done there and then. In the "old days," it would have taken 6–24 hours or longer for me to receive the X-ray jacket to look at the hard copy of the CT scan. I would have needed to gather copies of old labs, prior clinicians' notes, etc. from a paper chart. Many times, with urgent consult requests, we did not get the chart in time to review before seeing the patient. This would lead to duplication of testing, or worse, potential failure to recognize important clinical elements that are easy to see with our electronic medical record system. Now, when a colleague calls with a question, just about the only information they need to provide is the patient name or number, and I can pull up his or her data just about faster than they can tell it to me over the phone.

Other benefits that have been noted by clinicians include the increased likelihood of resolving patient concerns in the first visit, the ability to deliver more services in a single visit, and addressing prevention and other ancillary needs when patients make visits to address health problems. Respondents to an internal survey also indicated that use of an electronic medical record reduced unnecessary clinical laboratory, radiology, and emergency department utilization and increased the effectiveness of scheduled and unscheduled telephone contacts.

Much of the appeal of electronic medical records is the opportunity to improve quality by having patient information immediately available. Equally important and often as prominent when discussing electronic medical records is the availability of on-line, real-time decision support information. With KP HealthConnect, the latest clinical information will be available to physicians in the examining room to provide point-of-care recommendations for a wide variety of clinical conditions. We are building our practice guidelines and treatment pathways into the system. Permanente physicians already have access to the complete range of on-line medical journals from their desktops and in the examining room.

We also expect that KP HealthConnect, by allowing more personalized care, will significantly increase patient satisfaction. For example, staff will be able to use up-to-date clinical, social and patient preference information when caring for patients. Patients will have greater access to their own information and be full partners in decision-making. An after-visit summary will be printed for patients at the end of each appointment and will be available permanently online. Team care will be more patient centered. Since all information about a patient will be available, even a physician who has never seen a patient will immediately know his/her history and preferences. This should make each patient encounter more personal, individualized, and ultimately responsive.

Receiving care should be more convenient as well. Patients will be able to make the most of care/advice/information via telephone, web, and e-mail. Telephone wait times will be reduced and the need for callbacks to find medical records eliminated, allowing office personnel to rapidly retrieve essential information when the patient needs it. Web-based access to test results and e-mail messaging will allow each patient to attain greater autonomy in accessing information and can make it easier for them to send a question or request to their caregiver. Web-based availability of one's medical record on a 24/7/365 basis will allow patients to make decisions when it is convenient for them. Making personal and technical information available to patients over the Internet should make it possible for patients to conduct a variety of transactions with their doctor without having to interrupt their own lives to go to the office or spend time on the phone.

We expect that KP HealthConnect will create efficiencies for Kaiser Permanente and our members. There is already strong evidence from the regions where we have had an electronic medical record for some years that, as each appointment meets more of a patient's needs, the demand for appointments declines. Two years after our Colorado Region implemented an electronic medical record, we saw a 9 percent decline in age-adjusted annual office visits per member. Primary care visits declined by 11 percent; specialty care visits declined by 5 percent. Our Northwest Region experienced a similar 9 percent overall decline in the demand for office visits, and the breakdown for primary care and specialty visits was almost identical. It is worth noting that these two regions had implemented different electronic medical records systems, although their capabilities were very similar. Neither region intended to reduce outpatient visit rates—it appears to have resulted from more efficient use of appointments overall.

As we noted above, we expected visits to become more efficient. More than one issue will be able to be handled in a single visit. Since prescriptions and lab requests are immediately placed in the system, wait times will be reduced as will overall time spent at the doctor's office. There will also be lower pharmacy and laboratory costs than there would be with paper medical records. Copying costs are reduced. Resources and time dedicated to maintaining and transporting paper records will be reduced or eliminated. Administration of benefits and new products will be more efficient and accurate. Benefits information and information related to new products will be continuously available online, allowing for more accurate administration of services.

Finally, clinical research to support evidence-based care will be greatly enhanced. Comprehensive patient data will be available for larger populations and more accessible than ever before, allowing for significantly more robust research than previously possible, for a fraction of the cost, and taking relatively much less time. Some research that would benefit from very large populations may be possible for the first time. For example, the recently reported RAND Corporation ACOVE studies examined the extent to which physicians complied with an agreed upon set of standards in caring for an aged population. It included a sample of 400 patients and required thousands of hours of medical records extraction. The study cost hundreds of thousands of dollars. With systems like KP HealthConnect, the information would be available almost instantaneously, ultimately on an aged population of about 1.5 million people with considerably greater reliability given that abstraction can be eliminated. The research potential is almost beyond imagination.

In sum, the benefits to patients in terms of quality, convenience, service, personalized care, costs, and better science are considerable. While it is still unclear whether, in the long run, overall spending will decline as a result of implementing KP HealthConnect, if it breaks even, the new benefits for patients by any measure are quite considerable.

Making Electronic Medical Records Broadly Available

Kaiser Permanente has been working to implement an electronic medical record for many years. The promises of a single-system, user-friendly, comprehensive, electronic medical record for all of Kaiser Permanente are still a few years away. While we have begun broad implementation of our system, the federal government has begun to think about the ways it can enable health plans and health care providers across the spectrum to bring the benefits of health care information technology to all patients. The two most prominent ideas being developed relate to standard setting and financial incentives.

Standard Setting

The lack of widely accepted standards for health care information technology has had profound consequences for the development and dispersion of electronic medical records. First, it has increased the risk any company would face if it chooses to develop health care information technology products. Very few developers could afford to build a product using proprietary technology only to find that it is made obsolete by the subsequent adoption of standards with which it is incompatible. Similarly, few providers or health plans will make an investment in a costly system if they run the risk of having a suddenly outmoded system, unable to communicate with other systems. This explains why we have worked so hard to help the industry develop the tools that are the foundation of many systems now in use or in development. We worked closely with the College of American Pathologists in the development of SNOMED–CT, the recently adopted standard for medical terminology that the government is making available to everyone. We also actively participate in HL7 and other broad-based standard setting organizations. This allows us to contribute

our expertise to these groups and has helped us to anticipate emerging developments.

As the government moves to adopt an increasingly complete set of standards for health care information technology,

- ***The federal government should move quickly to adopt standards for interoperability.*** Priority should be given to:

  —identification of data standards appropriate for national adoption and gaps in existing standards,
  —provision of targeted financial support for public-private partnerships to develop and/or endorse such standards, and
  —leading public-private efforts to promulgate and maintain standards

  The Consolidated Health Informatics Initiative is an effective model—where the government, in collaboration with the private sector, identifies standards for the federal health care sector that will serve as a model for the private sector. This is an example of both federal leadership and the power of public-private partnerships. For this kind of effort to succeed, sufficient federal resources are essential.

- ***Efforts should be made to ensure that pioneers in the deployment of electronic medical records can easily comply with newly adopted standards.***

Financial Incentives

We are convinced that widespread adoption of health care information technology like KP HealthConnect is essential for sustained quality improvement. We also believe that this technology is essential to the development and application of quality measures. However, as MedPAC noted in its "Report to Congress: New Approaches in Medicare" released on Tuesday,

> "many barriers slow physician adoption of information technology. The costs of investing in information technology can be significant, the financial return is not certain, and any financial benefits will not necessarily accrue to the physician practice bearing the costs."

If we are correct that adoption of health care information technology is essential for sustained quality improvement, then support for health care information technology is needed.

Both public and private purchasers of health care are introducing quality-related financial incentives into the payment for health care. The Leapfrog Group has been a leader in the introduction of payment-related quality standards, especially for hospitals. Several large employers, including General Electric, Ford, and Proctor and Gamble, are supporting the development and implementation of approaches to linking payment to quality for physician care. And, some States have developed Medicaid payment methods that depend in part on quality. Discussions are now beginning about how payment incentives can improve care and outcomes for Medicare beneficiaries. Ultimately, for payment incentives to have real influence on quality, they should be directly tied to the care delivered during a specific time period. The kind of information needed to do this can only be made available through sophisticated electronic medical record systems.

- ***We urge the Congress to ensure that the federal government participates in the investment needed to implement electronic medical records.*** The Medicare and Medicaid programs are far and away the largest third-party purchasers of health care. As a general rule, providers and health plans care for beneficiaries of these programs on an administered pricing basis. They have no independent ability to set payment rates at a level that includes sufficient resources for investment in health care information technology. Moreover, there are few existing financial incentives for providers to pay up front for these systems. Even small increases in Medicare and Medicaid provider and health plan payments would help create momentum toward broad adoption. At the same time, providers and private health plans should be expected to work with other purchasers to ensure adequate private-sector investment in a health care information technology that helps everyone.

In closing, I want to congratulate the Subcommittee Chair and Ranking Member for this timely and important hearing. I would be pleased to answer any of the Committee members' questions.

Chairman JOHNSON. Thank you very much, all of you, for being here and for your thoughtful testimony, and for the extraordinary work you are doing and have done over many years. It is sort of startling to hear how much money has been invested, how far you have come, how deep you are into systems that are quite encompassing of both lives and institutions.

You heard Dr. Brailer's testimony. Now, you are doing it. How hard is this standard setting? Remember, we put in our original bill that came out of this Committee e-prescribing at the same year that we are going to bring all the seniors into the prescription drug access. It makes absolute sense, and you can hear it through your testimony, that these things should be coordinated from the point of view of quality health care and eliminating problems; but in the process of the Conference Committee, that 2 years became 8. So, there is a lot of resistance out there.

Now, what is the standards issue? How hard is it going to be for Dr. Brailer to set standards? You already know a lot about how different are your standards. Could you figure out interoperability if you needed to between your systems? How far do we have to go before we can at least complete this first step of what are the standards so then we can begin to address the other issues of money, of absorption, of integration, of implantation, of training? Yes, Dr. Wiesenthal.

Dr. WIESENTHAL. Well, I think certainly Dr. Overhage will also speak to this. Both of our organizations and others have actually invested very heavily in helping to contribute to the national standards. I don't think at this point that the standard setting is the hard part. It is the use of the standards and the software. We have gone to great lengths to incorporate, to actually develop many hundreds of thousands of terms for SNOMED Clinical Terms (CT) and to incorporate that into the work that we are doing. We use the LOINC laboratory standards that the Regenstrief Institute has developed and many others that are national. I don't think it is the standard setting that is the issue; I think it is encouraging institutions like ours and vendors to incorporate those standards in a rigorous, reproducible way so that the information can move back and forth.

Dr. OVERHAGE. If I may go just a step further. I think that, in order to do that implementation as was referenced, some of the important steps are certification, creating a capability to ensure that a plug and play capability—that may be a bad word with the computers they serve, are not quite that good. To ensure that standards truly are able to interoperate, and that we do not need to develop a mass of new standards but rather to utilize properly the ones that are there. We may need a reference implementation. I think Dr. Brailer mentioned that, a vehicle for testing against to make sure that those standards are implemented in a consistent fashion.

Ms. MARCHIBRODA. The government can rapidly accelerate adoption using carrots, not sticks, by just building it into their Federal government programs, whether it is—ultimately when electronic data is transmitted, to support currently required accountability measures for quality that CMS uses, or whether it is the public health surveillance that is conducted by local, State, and

public health agencies, when transmitted electronically, asking that it be transmitted using standards. There are a number of ways through its programs that standards adoption could be accelerated.

Chairman JOHNSON. Dr. Safran?

Dr. SAFRAN. Well, I think at the local level, the problem isn't standards, it is incentive for anybody to use them. So, when I am practicing in my own office, I keep my own chart. I may have it completely electronic, but there is nothing broken from my perspective. The thing that is broken is that when you are a patient and you have to go from my office to a specialist's office, and you have to retell the story, you have to send the medical records, you have got to request them, and you have got to retell the medications. There is no incentive for me to purchase a system or to—me, as a physician in my own office, to have—I may have a completely good electronic record that solves my problem. The problem is really a patient's problem, our citizen's problems, and so there is no—it is the incentives.

So, in Kaiser, we have sort of an interesting unified incentive of the physicians and the hospitals where—and the health system. For most of us, the practice outside of any sort of unified system, we need better incentives for this kind of collaboration and health care. My belief is that we need to empower our citizens, the consumers, to demand that their physicians use e-mail and electronically transfer their records.

Chairman JOHNSON. Mr. Stark.

Mr. STARK. Well, I had in mind a modest incentive, Madam Chair, like we wouldn't pay you until you did it. I know that would not be a popular solution, but at some level, I am afraid that—it might be only for part of your practice, but it seems to me that convenience—and as you point out, why should you go through the inconvenience. I appreciate that.

I think you are quite right there, because somebody is going to go off to a radiologist or somebody else who needs information from you and that is, your office probably says, look, we give out that information from 3:30 to 4:00, and you call in on this number, because we don't have time to be answering the phone off and on all day. Possibly that would be eliminated, and then one of the underlying things, that you all would be more efficient in, as you described, Dr. Wiesenthal, you could get the answer more quickly because you wouldn't have to spend 24 hours or 36 hours waiting for hard copies to get transmitted by United Parcel Service of America or something.

That is hard to sell somebody when you are looking at them and say, look, you have got to spend $100,000 to train, new software, input people, and buy a new system for your office. To some extent, Madam Chair, I think our witnesses make the case for us to move more quickly rather than later, because the more this gets ingrained and the longer it goes without—even if it isn't enforced, as long as you know what is out there—I still use—nobody knows what MYM is, and I should use whatever this new system is to keep my checking account. The MYM, you can't buy it anymore. I know it is going to crash. As sure as I sit here, I know it. Then I am going to spend a month typing into one of these new ones.

The new one, you know what? I can get my bank account downloaded automatically; I can't in my old one.

If I took the time—but I know what it is going to be when the system crashes. There is no doubt in my mind what I am going to have to do. I hope we can—I leave it up to the Chairman; she is going to have to take the flack as to who is going to be mad at her. You are not going to make everybody happy, but I think you are going to have to do it.

Chairman JOHNSON. One of the reasons we are having these hearings is that we lost in conference because we hadn't laid the base of understanding.

Mr. STARK. I think you are going to have to pick a system, Madam Chair, and are just going to have to say, that will be it, we agree with you, let us go.

Chairman JOHNSON. Well, we do want your input under those kinds of issues.

Mr. STARK. Good luck.

Chairman JOHNSON. Mr. McCrery.

Mr. MCCRERY. Ms. Marchibroda, you seem to disagree about the necessity of setting standards. You seem to indicate in your testimony that you thought that was one of the barriers to getting more people or more entities to adopt IT, but there is not a set of uniformed standards out there. Did I misinterpret your——

Ms. MARCHIBRODA. Absolutely. We are very enthusiastically supportive of national standards.

Mr. MCCRERY. I know, but you said in your testimony that you thought the lack of adoption of national standards was an impediment to hospitals and doctors and others implementing IT.

Ms. MARCHIBRODA. To correct——

Mr. MCCRERY. Dr. Wiesenthal seemed to say that is not a problem.

Ms. MARCHIBRODA. To correct my statements, what I was saying was in the past or even now, given the low level of adoption of standards, the lack of standards and interoperable systems creates a barrier to widespread adoption. Because of the fragmented nature of our health care system where we need to mobilize lab data, prescription data, data about the patient, without standards we are not able to do that. So, we need to adopt the codes and the HL7 messages, we need standards to be adopted, and that will remove a barrier.

Mr. MCCRERY. That is what I thought you said. Do you agree with that, Dr. Wiesenthal?

Dr. WIESENTHAL. I do. What I meant when I made my statement earlier was that I think that the target standards are pretty clear now. Ten years ago, when we started, it was more of a risk to say SNOMED CT is going to be it, and we might have made an investment that would have been very, very expensive and very, very wrong. I don't think that that is a risk anymore. The targets, people know what the big targets are, and that isn't slowing them down now.

Mr. MCCRERY. Okay. I believe in both of your testimonies, Ms. Marchibroda and Dr. Wiesenthal, you allude to the fact that some physicians are reluctant to adopt IT, and they are a barrier to doing this. Is that right?

Dr. WIESENTHAL. I don't believe that that is the case anymore. I think there may be a few. The fact is, as Congressman Gingrey said, I think most physicians feel as he does, it is time to get on with it. They know that this is going to be difficult and painful, they know that it is going to be very disruptive in their practices. They know that at the end of the day they can't be modern without doing it. Doctors are not technophobes; they adopt new technology when it is going to make their quality of care better or their practices more efficient. What they are really afraid of—and the same thing is true of nurses—is that we might introduce something that will actually make them less efficient and less effective, and that would be bad.

Ms. MARCHIBRODA. To clarify what I said in my testimony. I think adopting IT by clinicians, it is really hard. It is like playing tennis with the left hand when you are right-handed and you have to change processes within your office. It is a barrier, but I think it is one that can be overcome. I think a comprehensive set of policy changes and practical strategies to support clinicians as they make this migration is very important, and it has to do with getting systems out there that use standards, number one, having leadership at the highest levels of each organization, providing some support and incentives for those who need it, and aligning those incentives between those who bear the cost of those tools and those who reap the benefits. Then helping to support them along the way. Dr. Brailer talked about a resource center that AHRQ is funding, and there are a wide range of initiatives that are sprouting up across the country to help clinicians with this migration.

Mr. MCCRERY. Okay. Thank you.

Chairman JOHNSON. Thanks. I wanted to pursue this issue of incentives. A number of you mentioned that the incentives are misaligned. We are aware of that, but I would like to hear from your point of view what is misaligned and what you think we can do about it. The standards issues will move along, we will be hearing back from Dr. Brailer, he has a report due in just a couple of months, and at each step we will work together. We certainly have to do something about money. Any comments you want to make about what you think it costs, how we could help incentivize people to make the investment would be welcome.

On the larger issue, there are laws and regulations and structures and old ways of doing business that discourage the integration of care, and we are going to this year and next year have to find a way of reforming the way we pay physicians. So, if we can think through this change in the way we manage care and the way that the physician participates in care at the same time we are thinking through how do we pay physicians, since clearly the current system isn't working, that would be very helpful. You are far more in a position to do that than I am, and I invite you over the next months to take back to your organizations that challenge to think, how does this change in the system through which we deliver care? What are its implications for the way we pay people for care? That is one item. Then if you will just talk about misaligned incentives, barriers a little bit more, I would appreciate that. Dr. Safran.

Dr. SAFRAN. I think one of the ways that we have organized care in this country is around the episode of care. Our incentives for payment then are based on this episode of care. For the patient, being well is really a health trajectory, it is a journey, and there is no incentive for the clinician to necessarily make the patient well. The health care expenditures are obligated by a patient's decision whether or not to seek care. So, we need to be interacting with patients before they come to the physical encounter, the physician's office or the hospital. We need a vision of a virtual encounter whereby we are providing care and we are incenting clinicians to provide care virtually.

Right now, 40 percent of your constituents would say that they would like to e-mail their physicians. Probably no more than 5 to 10 percent of American physicians right now want another channel of communication with their patients. They are not reimbursed for that. That is not considered part of the care process. Yet that communication, before care worsens, might prevent a hospitalization. It might prevent intravenous therapy where a simple oral medication prescribed early via telephone, Internet, telemedicine, whatever you want to call care at a distance, we could enable that kind of care. We prevent physicians inside of hospitals for reimbursing them for care once their patients go home. This is particularly true of care of infants where the hospital-based pediatricians, neonatologists, can't bill for the continued care once a child goes home.

So, we have created all these barriers. The technology, while we talk about it as computers, it is really a communication device that allows us to coordinate, communicate, and collaborate with our patients in a way. We need to recognize that and then reimburse around the entire process of care rather than just the episode.

Chairman JOHNSON. Dr. Overhage.

Dr. OVERHAGE. Thank you. It is a very important and central question that you ask, obviously. I think that there are two components that we have to think about. One is the inefficiencies, the excesses that are available to squeeze out of the process, which can be captured more quickly and easily. I have used the example in my testimony of sending a laboratory result from a laboratory to a physician's office costs 80 cents today. That type of cost can be addressed very directly and has a rapid turnaround and a rapid payoff and may support the infrastructure, at least partially support the infrastructure that is needed.

The other is this larger issue that Dr. Safran was referencing which is, as we can use tools to improve the quality and safety of care, there are huge potential savings. Capitalizing on those will require very dramatic changes in how we reimburse our clinicians. That is going to be a longer road. So, I think we have to take advantages of those shorter term efficiency issues in order to get started and to demonstrate the value early so that we don't have to wait.

Chairman JOHNSON. Dr. Wiesenthal.

Dr. WIESENTHAL. I agree with our colleagues. I would point out that Kaiser Permanente is an example of what happens when incentives are aligned, because we are an integrated system, so it is our pharmacy, our laboratory, our hospitals. If I do something

as a clinician that turns out to create an efficiency for the pharmacy, it acts powerfully in the right direction; whereas, if Dr. Safran decides to transmit prescriptions electronically, it doesn't save him any money. He isn't any better off. The pharmacy down the road, or wherever that goes, will be able to reduce their costs, but he doesn't see any of the benefit of that. That is a fundamental issue in a nonintegrated system that somehow has to be addressed. Somehow the physicians in the fee-for-service community, which is two-thirds of the doctors in the United States today, have to somehow see the benefit of the up front expense that is enormous they must make in order to put these systems in that creates efficiencies for everybody else but not for them.

Chairman JOHNSON. I think it is very important that you try to think about these things with your folks. How do we—do we put it in with a no interest loan, and then through your savings you can pay it back? How do we front the cost? We can incentivize the costs. We have done that before: we won't pay you unless you do it electronically. There are lots of things that you can do, but you need to be able to say here is the various choices of equipment, here is the training that comes with it, and then here is how you can afford it. I am perturbed about, why the medical community as a whole. I see individual physicians very excited about this, and they will show you but it doesn't spread. Sometimes they can't get their own colleagues to—so it is a problem.

Dr. WIESENTHAL. This is the hardest thing I ever did. When I changed 7 years ago from paper records, and I led the development of the system, I understood exactly how it worked, I knew all the functions. It literally changed every step I took during the day. It was that that was hard. Not learning how the software works or putting the computers in or making the connections go okay. It is—I would ask you to try to imagine how—if somebody came to your office tomorrow and changed the way you did everything. That is what is difficult. Actually, in terms of our cost of implementation, those costs, the change of management costs and training costs related to them, the change in the way work is done are more than 50 percent of the costs of implementing the system. Trying to figure out a way to pay for that in a nonintegrated system, unlike ours, I think is extremely difficult.

Chairman JOHNSON. It is interesting you say it is 50 percent of the cost. Okay. Thank you very much. I appreciate it. Your testimony was excellent. I enjoyed reading it. We will continue to learn a lot from it. If you have information you think we should be aware of as we move through this process, our goal is to increase the general level of knowledge of the Congress in these areas, and then to work closely with the Administration to push forward on this initiative, and eventually to be positioned when we legislate next year, if necessary, to change rules and regulations and payment structures so that they are more appropriate to an electronic era. Thank you very much for your help today and for your participation.

[Whereupon, at 4:28 p.m., the hearing was adjourned.]

[Submissions for the record follow:]

Statement of American Academy of Family Physicians

Introduction

This statement is submitted to the Ways and Means Health Subcommittee hearing entitled "Health Care Information Technology," on behalf of the 93,700 members of the American Academy of Family Physicians. Family physicians practice office-based primary care, predominantly in medical practices consisting of one to five physicians and often in underserved areas. In fact, slightly more than a quarter of family physicians work in single or two-person practices that provide health care to some 38 million patients every year. These small practices survive on extremely tight operating margins and usually are unable to capitalize new technology equipment, provide necessary training and support serious disruption of their practice. The primary care physicians who provide most of the health care in this nation do not have access to the finances and capital available to hospitals, academic health centers and other large institutions. Despite a strong interest in electronic health record (EHR) technology, the large up-front costs like the initial fees and licensing agreements are prohibitively expensive for these physicians.

Nonetheless, Academy members are convinced that patient safety, effective evidence-based care coordination and the reduction of duplicative and unnecessary care require EHRs. Therefore, the AAFP's goal is to have at least half of its members using EHRs by 2006. As a result, the Academy has created a Center for Health Information Technology to improve the availability of health information technology products aimed at this segment of the physician market.

The Center's mission is to promote the adoption and optimal use of health information technology by AAFP members, office-based physicians and allied health professionals, for the purposes of improving the quality and safety of medical care, as well as to increase the efficiency of medical practice. The Center is using a multifaceted approach to realize this mission through advocacy, education, cooperation, and standardization. At the heart of these efforts is the EHR. The EHR enables family physicians to deliver the highest quality, most efficient, and safest care for their patients.

The following programs, currently ongoing through the AAFP Center for Health Information Technology, illustrate the facets of our efforts.

Partners for Patients

In October 2003, the Academy's Center for Health Information Technology announced that it had negotiated purchasing agreements with a core group of software and hardware vendors around four principles. These joint purchasing agreements between the Academy and twelve information technology vendors is called, "Partners for Patients."

The Partners for Patients initiative demonstrates our collaboration with the health information technology industry. It is also a forum to work with vendors on standards development. In addition, we are establishing best practices to address contracting, pricing, and technical support. Partners for Patients vendors have agreed to the following principles:

- **Affordability:** the costs for the acquisition and use of health information technology should be within the budget of small—to medium-sized medical practices.
- **Compatibility:** adoption of health information technology should not require that clinicians and practices completely and routinely replace current systems when new components are needed. Information systems and their components should increasingly be based on standards that result in "plug and play" compatibility, similar to that found in the video and audio industries. There should be no "vendor lock" resulting from proprietary systems or interfaces.
- **Interoperability:** Data exchange schema and standards should permit data to be shared between clinician, lab, hospital, pharmacy, and patient regardless of application or application vendor.
- **Data Stewardship:** Clinicians who use health information technology should retain control of the data that are the product of their work, subject to the rights of patients to access their health information and control its release. Physicians should be entitled to choose an independent and unbiased third party to be a steward of the data on their behalf.

These principles address significant technological and financial barriers to the widespread adoption of health information technology in the ambulatory physician office. With the commitment of our partners, coupled with the support of 40 addi-

tional vendors, we believe that progress toward achievement of the principles is accelerating.

Continuity of Care Record

Until there is adoption of widespread interoperable data standards that are being used by every component of the health care system, the Academy will work to produce and promote the use of a patient summary content standard to allow patients access to an easily updated, portable copy of their pertinent medical history. This new standard is called the Continuity of Care Record (CCR).

Unlike other health information technology standards, the Continuity of Care Record (CCR) is designed from the start to facilitate communication from clinician to clinician and clinician to patient. This commonly shared method of exchanging this critical clinical information among clinicians is particularly important.

The CCR is a newly established patient summary content standard that can be accessed as a PDF, HTML or Word document with basic health information such as diagnoses, medication list, allergies, and recent procedures. Physicians can forward this document to subspecialists when a patient is referred and patients can carry it with them to promote continuity, quality, and safety of care. Having this information readily available at the time of care or in emergencies could significantly reduce duplication of lab tests or diagnostic procedures, as well as improve patient quality and reduce medical errors from faulty or incomplete information.

The CCR is being sponsored and developed by the AAFP, the Massachusetts Medical Society, and Healthcare Information and Management Systems Society, with input from many other individuals and organizations, under auspices of the standards development organization American Society for Testing and Materials. Balloting was completed in early 2004 and pilot projects are likely to start later this year.

The CCR is that digital file, produced by using readily available software like Microsoft Word, or generated from hospital and practice EHR systems when a patient leaves the ER, office, or is referred from a primary care physician to a subspecialist. Because the CCR is being designed to be a simple content standard, it will be possible for different EHR systems to both import and export the information contained in the CCR, and to update that information after each encounter or visit. Data in similar documents can be displayed in a variety of formats, such as HL7 messages, HTML (browser), PDF, and Word, and thus printed versions of the CCR will be available for patients who desire them. Adoption of the CCR by the medical community and information technology vendors will be a first step in achieving interoperability of medical records. To promote both the CCR and the dissemination of EHR technology, several medical specialty societies have formed a coalition of experts in health information technology. Because the CCR is a critical step toward interoperability right now, the federal government whole-hearted support of this standard is critical.

Physicians' Electronic Health Record Coalition

The AAFP is one of the founding members of the Physicians' Electronic Health Record Coalition (PEHRC), which recently formed to collaborate on issues of health information technology. The medical specialty societies that form the membership of the PEHRC agree that promoting workable information technology solutions for the health care system is too big for just one organization. PEHRC will be a strong physician voice in the health information technology sphere. The coalition will influence industry, government, and physicians to provide better health information technology that will achieve better efficiency, quality and safety.

Doctor's Office Quality—Information Technology (DOQ–IT) and EHR Pilot Project

The following two projects in which the AAFP is involved, explore how to best implement EHR technology in physician offices. Both projects promise to reveal critical success factors for small—to medium-sized practices in preparing, choosing and implementing an EHR package.

The *Doctor's Office Quality Information Technology (DOQ–IT)* project, funded by the Centers for Medicare & Medicaid Services, was awarded to California's quality improvement organization (QIO) in partnership with the AAFPCenter for Health Information Technology, in October of 2003.

The DOQ–IT project endeavors to lead the way in assisting small—to medium-sized physician offices in migrating from paper-based health records to EHR systems, storing health information electronically and utilizing computer-generated decision support tools, including preventive service reminders and clinical guidelines.

This project offers an integrated approach to improving care for Medicare beneficiaries in the areas of diabetes, heart failure, CAD, hypertension, osteoarthritis, depression, and preventive care.

The DOQ–IT project will educate small—to medium-sized physician offices on EHR system solutions and alternatives as well as provide information on cost, risks, and benefits of IT adoption. Working closely with participating physician offices, the project will conduct a needs assessment, identifying an EHR system from multiple vendors that meets specific office needs. Technical and quality improvement assistance will be provided, including uploading data, acquiring reports, and reorganizing physician office workflow to integrate and optimize IT use, to ensure EHRs are used to their fullest capability to improve quality of care. Through comparative clinical quality measure reports, the project also will assist physician offices in identifying potential areas for quality improvement.

In May of this year, the Academy was awarded $100,000 from the Centers for Medicare and Medicaid Services to evaluate the implementation of an *EHR Pilot Project*. This project implements EHR technology in small—and medium-sized ambulatory care practices. This project operationalizes our collaboration with the industry. The AAFP and Partners for Patient vendors are moving from policy and agreement to action. Education of the AAFP members on EHR implementation in small—and medium-sized practices is an expected outcome of this project.

AAFP is leading this small-scale collaborative pilot project with Medplexus, Siemens Medical Solutions, and Hewlett-Packard to implement, study and promote the transition to use of EHR in small—and medium-sized family practices. Six practices have implemented EHR technology and are currently utilizing it as part of their clinical workflow. Participating practices consist of solo physician offices in California and Pennsylvania; two physician practices in Utah and North Carolina; a four physician practice in Ohio and a five physician practice in Oregon.

In June 2004 each office a six-month demonstration using the Medplexus XML—and Java-based EHR software application, at no cost to the practices. Siemens Medical Solutions, Hewlett-Packard, and Medplexus have generously committed to host the application, provide hardware and provide the software, training, and application management without charge to the participating practices. The Health Information Management Systems Society (HIMSS), the nation's largest health IT industry membership organization, is co-administering the pilot with AAFP and has lent valuable assistance to the Center for Health Information Technology staff.

The pilot project's main objectives are to intensively study the barriers and keys to success during the implementation process, and to combine this goal with a proof-of-concept for the applications service provider model of delivery of scalable electronic health record systems. An additional goal is to identify those special needs for small and solo practices and help Medplexus, and subsequently other vendors, address those needs in their EHR.

Summary

The Academy has made promoting the dissemination and utilization of health information technology a strategic priority for the organization. We are committed to helping physician offices begin the process of transforming the ambulatory setting. This transformation will require physician offices to rely upon health information technology to achieve advances in chronic care management, quality improvement and improved patient safety.

However, so many individual factors can affect the choice of adopting technology in the small—to medium-sized practice that it would be counter-productive to mandate the immediate implementation of any EHR technology. The lessons learned through DOQ–IT and the AAFP's EHR Pilot Project are expected to yield vital information for small—to medium-sized ambulatory physician practices. For example, physicians currently lack adequate information about how to ready their practice for an EHR, how to choose an appropriate technology package and how to quickly implement an efficient clinical workflow utilizing an EHR. These barriers to technology adoption exist beside the significant financial hurdles that currently prevent many practices from purchasing EHRs.

The Center for Health Information Technology has been pleased to work with Dr. David Brailer, National Health Information Technology Coordinator within the Department of Health and Human Services. Dr. Brailer is committed to the active promotion of the CCR and dissemination of EHR. The clear intersection of priorities between Dr. Brailer and the Center for Health Information Technology has lead to a close working relationship. No one entity can solve the problems that plague our health care system, yet collaboration to utilize health information technology among physicians, patients, technology vendors, insurers, and the federal government holds great promise. The AAFP has been leading collaborative efforts around health infor-

mation technology, and we believe Dr. Bailer's work will break down barriers to collaboration and promote action.

The Academy appreciates the opportunity to submit this statement outlining the experience that the ambulatory physician's office has had with EHR and looks forward to continue out work with the Ways and Means Committee on issues related to health information technology.

Statement of American Clinical Laboratory Association

The American Clinical Laboratory Association (ACLA) congratulates Chairwoman Johnson and the Subcommittee on Health for holding this hearing on health care information technology (IT). ACLA is an association representing independent clinical laboratories throughout the United States including local, regional and national laboratories.

Increasingly, clinical laboratories are using IT innovations to improve patient care, as well as to promote the highest level of efficiency and affordability. Implemented properly, IT will provide ready access to timely, relevant, reliable and secure information through an interconnected infrastructure affording better health and health care.

ACLA wants to make sure that the laboratory industry is an active participant as IT becomes a more important part of health care delivery. Specifically, we want to avoid the problems that the laboratory industry experienced with the implementation of the HIPAA standard transaction requirements in which requirements did always not match the operational realities of providing laboratory services and billing for these services. Accordingly, ACLA is taking a more active role in the IT issue by joining two private sector coalitions on health care IT, the E–Health Initiative (E–Hi) and the National Alliance for Health Information Technology (NAHIT).

ACLA is also currently working in collaboration with the Centers for Medicare and Medicaid Services' (CMS) Office of Research, Development, and Information on the development of IT in the health care sector. This demonstration project seeks to investigate the potential benefit of linking existing data streams including laboratory, pharmaceutical, and radiological data through the Doctor's Office Quality—Information Technology (DOQ–IT) project. ACLA is committed to helping the Administration move from paper to electronic health records. ACLA is pleased CMS sought the clinical expertise of the association and its members since laboratories have been utilizing this means of information sharing for many years.

Again, congratulations to Chairwoman Johnson and the entire Subcommittee on Health for holding this hearing. ACLA looks forward to working with the Committee to facilitate the adoption of IT throughout the health care sector.

Statement of American College of Physicians

The American College of Physicians (ACP), representing over 115,000 internal medicine physicians and medical students, is pleased to provide written comments on the Federal role in providing incentives to promote health information technology (IT). These comments are provided for the June 17, 2004 hearing held by the United States (U.S.) House of Representatives Subcommittee on Health of the House Ways and Means Committee.

Introduction

The United States healthcare system is highly fragmented in terms of the vast array of disparate, proprietary non-communicating healthcare information systems in use. Perhaps the largest barrier to adoption of health information technology besides cost is that the current Medicare and private sector insurance plans actually incentivize physicians and other healthcare providers *not* to use medical information technology. This results from most health IT systems not being designed to communicate with other health IT systems, which has resulted in the creation of thousands of health information silos all over the country. Another problem that has contributed to the creation of the information silos is that for virtually every component of care—drugs, lab results, digital imaging, disease classification, procedures performed, and electronic health records—there are multiple terminologies in use within each component. For drugs alone, there are at least 12 separate systems for nam-

ing medications, their ingredients, dosage, and route of administration.[1] So, even if the U.S. developed a system that allowed physicians and other health care providers to easily transmit health care data and if these providers implemented the systems into their medical practice, they'd still not be using a single uniform language.

The Institute of Medicine's (IOM) 2001 report *Crossing the Quality Chasm—A New Health System for the 21st Century,* highlights the U.S. healthcare system's reticence in taking advantage of the information technology revolution "that has been transforming every other aspect of society." The IOM report warns: "In the absence of a national commitment and financial support to build a national health information infrastructure—the progress of quality improvement will be painfully slow."[2] President Bush, in his January 20, 2004 State of the Union speech, agreed that the time to bring advanced information technology to healthcare is now: "By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care."[3] The President has backed his support for expanding IT use in the healthcare sector by earmarking $152 million in his proposed Fiscal Year 2005 budget for health IT initiatives.[4] To underscore the federal commitment to these goals, in April 2004, the President announced creation of a new position to lead the federal effort, the National Health Information Technology Coordinator and tasked the coordinator with developing a national plan within ninety days.

The American College of Physicians (ACP) agrees with the IOM's and President's call to bring the latest advances of information technology to all sectors of the healthcare marketplace, underwritten with federal support and leadership. Health information technology and creating an interoperable healthcare data system, i.e., one that allows HIT systems throughout the country to communicate with each other, will revolutionize healthcare and will give individual patients greater knowledge and ability to improve their health status. An interoperable healthcare data system will facilitate the delivery of a higher standard of quality to the U.S. healthcare system by increasing the availability of healthcare data, making care safer and less costly. As such, ACP believes creating incentives to improve health IT adoption and creating interoperability are goals well worth the effort. Achieving these goals will not be easy. It will require overcoming steep barriers of resistance to system change, and a willingness to endure what will surely be a long and taxing process of converting old systems to new. Financial incentives for health IT adoption are needed and health IT standards should be developed cooperatively and voluntarily with active provider input, with the federal government sharing in the cost of achieving the interoperability of health care data that is sorely needed. In addition, new interoperable systems be carefully tested before widespread implementation.

Even if the United States were able to overcome the enormous challenges which must be surmounted to attain a truly interoperable national healthcare information system, physicians likely would not elect to use the system and continue to use a paper-based or an unconnected legacy health IT system that is already in place in their medical practice. This is because the current Medicare and private sector insurance plans actually incentivize physicians *not* to invest in or use medical information technology. The balance of this testimony will focus on the benefits, barriers, and incentives for adopting health information technology in the physician practice and ACP recommendations for achieving this critical national goal.

Benefits of Health Information Technology Adoption in the Physician Practice

Recent reports[5, 6, 7] show that while only 5% to 9% of American physicians use electronic health records (EHRs) on a regular basis, there is a great deal of variability within geographic regions. For example, EHR adoption in Massachusetts is as

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[1] "Establishing an Electronic Infrastructure," Draft Report of the Electronic Medicine Committee of the Florida Medical Association, Glen Davis, MD, January 10, 2004.

[2] Crossing *the Quality Chasm—A New Health System for the 21st Century,* Institute of Medicine, March 2001.

[3] Bush, George W., State of the Union Speech, Washington, D.C., January 20, 2004.

[4] "White House Budget Includes Healthcare IT Funds," www.ihealthbeat.org, February 4, 2004.

[5] Computer-based patient records: searching for the right solution. Healthcare Informatics. 2003.

[6] Renner K. A cost-benefit analysis of electronic medical records. Am J Med. 1 April 2003.

[7] U.S. trails other English speaking countries in use of electronic medical records. Harris Interactive News. 1 October 2001.

high as 30.2%.[8] A much smaller number of physicians, about 0.1% nationally according to one expert in the field,[9] have taken the next big step to make their practices virtually "paperless." The core of a paperless office is a system that integrates EHRs with physician practice management, patient scheduling, and clinical decision support software. Such software has the ability to facilitate many critical practice functions, including patient record keeping, scheduling and communications, issuance of bills and tracking of claims, ordering and receipt of diagnostic test information, generation and tracking of physician referrals, measurement of physician and staff productivity and performance, internal administrative workload and budget control, and real-time clinical decision support (CDS). CDS software, such as the Physicians' Information and Education Resource (PIER), ACP's highly regarded real-time point-of-care system, delivers current medical research information and best clinical practice information to the physician at the point of care when the physician needs it. PIER aids physicians in the diagnosis and treatment of hundreds of conditions and also offers educational support to patients, with physician-selected print-outs available at the push of a button.

In its fully realized form, a paperless office can enhance the quality of care that a physician practice delivers while also offering an array of other benefits. These can include the following:

A. Instant access to patient health data from any location with a computer and Internet access;
B. Real-time clinical decision support at the point of care;
C. Updating of the EHR while the patient is being seen;
D. Digital transmission and receipt of all patient lab requests and results, physician consult requests and reports, and patient prescriptions;
E. Medication and formulary information and advice, aimed at avoiding errors and untoward drug interactions and keeping drug costs as low as possible;
F. Coding advice to physicians to assure accurate documentation of a visit's level of complexity;
G. Generation of patient bill and patient take-home medical summaries, condition-specific information, and treatment instructions for patients before leaving the office;
H. Scheduling patient appointments and sending reminders to patients about important treatment items and upcoming tests and appointments;
I. Digital transmission and tracking of claims sent to insurers; and
J. Physician performance measurement and health care outcomes research.

Technology and software already exist that would allow physicians to spend more time seeing patients and less time on paperwork; however, physicians in the United States have been slow to embrace this new technology. England has committed $17 billion to wire every hospital, clinic, and doctor's office. All of England's 50 million citizens are expected to get an electronic medical record by 2005, and, by the end of 2008, the system will handle an estimated 5 billion transactions a year, including electronic appointments, prescriptions, and access of patient records.[10]

In paperless offices, all patient information is instantly available to the physician; not only in the exam room but anywhere an Internet-linked computer can be accessed. With the proper safeguards, this connectivity can be achieved over the Internet, thus allowing physicians to obtain the necessary patient information to render an appropriate clinical decision. Quality of care should be improved by eliminating the risk of having to rely only on the physician's and/or patient's memory or the patient's description of symptoms left in a telephone message.

The quality of patient care may also be enhanced by automated system reminders, which alert both physicians and patients to the need for necessary treatments and tests, such as periodic physicals, flu shots, hemoglobin A1c tests for diabetics, colonoscopies, and mammograms.

A study of small physician practices in California documented how using EHRs had had a visible impact on quality: "Quality benefits were common . . . almost all users reported increased quality of patient care due to better data legibility, accessibility, and organization, as well as prescription ordering, and prevention and disease management decision support".[11]

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[8] Berman J. Survey reveals growing number of tech-savvy doctors. Health-IT World. 14 August 2003.

[9] Squires S. Doctors go digital. Washington Post. 15 May 2001:HE10.

[10] England's health system to get major technological upgrade. Wall St J. 4 December 2003.

[11] Electronic Medical Records: Lesson from Small Physician Practices. Ihealth Reports. California HealthCare Foundation; October 2003.

Most EHR software includes physician prompts for key clinical questions that should be asked based on past history and diagnosis, avoiding critical oversights. Prescription errors caused by illegible handwriting are avoided when physicians can simply place a check mark next to correct medication(s). Such software also provides medication conflict warnings, thereby averting potentially dangerous drug—drug interactions.

The benefits for patients and the health care system at large can be enormous. According to the Leapfrog Group for Patient Safety, computerized physician order entry for prescriptions alone can substantially reduce serious medication errors. One major Boston, Massachusetts, hospital had a 55% decrease in medication errors after its computerized physician order entry was installed, while a hospital in Salt Lake City, Utah, experienced a 70% decrease in antibiotic-related adverse drug events.[12]

Barriers to Health IT Adoption in the Physician Practice

Three recent major studies that examined barriers to EHR adoption found that the largest barrier to health IT adoption cited in the studies is lack of adequate funding and resources. This finding held true in the physician and hospital sector and across the spectrum of physician practice size.[13, 14, 15]

Adopting major health IT components and converting to a paperless physician office has many costs and obstacles physicians must fully weigh before making such a major change in how they do business. The time, cost, and practice disruption involved in purchasing and learning how to use a new system has to be balanced against its potential benefits and ability to recover the initial investment. Important start-up costs and obstacles that the physician must carefully consider include the following:

A. The cost of purchasing and/or upgrading hardware and new software.
B. The time and cost of system testing and customization before implementing new EHR, practice management, clinical decision support, and other software.
C. The cost of designing and building or redesigning and renovating the office's physical layout to accommodate a paperless operation.
D. The cost and time of training staff to use new health IT software and related updated office protocols.
E. The time and cost for existing practices to upload paper medical records into an electronic health record format.
F. Short-term loss of productivity and practice revenue while the new system is being installed and debugged and staff is learning new software and office protocols.
G. Lack of interoperability of healthcare data among health IT systems.
H. Ongoing costs of system maintenance, upgrading, technical support, and staff training.
I. Temporary loss of system access due to computer crashes or power failures.
J. Use of digital data entry devices, such as an electronic stylus, electronic dictation, or a keyboard.
K. Patient resistance to the new system's outputs, such as computer-generated bills, referrals, and prescriptions.

Software/hardware start-up costs for adopting health IT solutions and creating a paperless office depend on a wide array of factors. These factors include the number of physicians comprising the practice and deciding whether to purchase EHR/practice management/clinical decisions support software and install new servers and workstations, or to lease software and/or servers from an application service provider. Cost is also driven by the number of links to the servers, e.g., links to reference labs and to area hospitals, which allow direct electronic transmission of patient medical data. Besides initial hardware and software costs, practices need to consider ongoing costs, such as Internet access and ongoing system maintenance costs. An October 2003 report entitled "Electronic Medical Records—Lessons from Small Physician Practices," which studied 20 small practices in California, showed

[12] Computerized Physician Order. Leapfrog Group for Patient Safety Fact Sheet. 18 April 2003.

[13] Medical Group Management Association (MGMA), Medical Group Management Association Survey, 2001.

[14] Healthcare Information and Management Systems Society (HIMSS), 13th Annual HIMSS Leadership Survey, 2002.

[15] Medical Record Institute (MRI), 4th Annual Survey of Electronic Health Record Trends and Usage, 2002.

that "initial costs ranged from $15,000 to $50,000 per physician, with a median cost of $30,000 per physician"[11]; this report focuses on EHRs, so creating a true paperless office would require an even greater capital investment.

Incentives to Health Information Technology Adoption in the Physician Practice

The vast majority of small physician groups and hospitals, as well as many large organizations, are not implementing EHRs and other health IT solutions despite the potential gains to patient safety and improved quality. The primary reason for not implementing these health IT solutions is that EHRs have an adverse financial effect on most physicians' practices and those of other healthcare providers, even if they believe the technology to be useful and efficacious. This lack of health IT adoption allows avoidable medical errors and deaths to occur while these beneficial technologies remain underused.

Despite the long term benefits realized by patients, payers, purchasers and society as a whole, physician groups and hospitals are making rational economic decisions when they choose not to invest in EHRs and other health IT solutions. Hospital and physician investments in EHRs are costly, pose substantial economic risks and have few economic benefits to the purchasers. Despite being on the market for over a decade, demand for a robust EHR health IT solution is low because total cost of ownership (purchase price, implementation, maintenance, and impact on operations costs) is too high. EHRs are costly because of the large upfront investment needed for technology and infrastructure, but also because of the high costs of managing concomitant clinical and administrative changes. They are risky because the implementations may not succeed, and also because of the EHR-driven changes in the workflow, communication and decisionmaking processes for those who implement these systems.

The current federal approach to reimbursement of health care services did not contemplate health IT. EHRs and health IT present a new and unique category of clinical technology financing. The current Medicare reimbursement system for physicians—the Medicare Resource-Based Relative Value Scale (RBRVS)—does not recognize use of EHRs and health IT. The reason is that the use of these health care solutions are considered "atypical" and therefore not a reimbursable service under Medicare. There are no allowable billing codes for critical new health IT solutions such as e-visits/e-consults, which are structured e-mail communication between the patient and physician which allow for a cost-effective medical service to be delivered to patients beyond the face-to-face clinical setting. Thus, the Medicare payment system is a disincentive for physicians to invest in health IT solutions such as EHRs.

At the same time that physicians are considering implementing health IT solutions into their medical practices physician payment cuts are expected in 2006 due to the fundamentally flawed Medicare Sustainable Growth Rate (SGR) formula. The SGR is formula is simply unworkable; it requires Medicare actuaries to predict the unpredictable, leads to constantly-changing government cost estimates and creates volatile payment swings that undermine medical practices' ability to make rational business decisions such as health IT investment and remain financially viable. The Congressionally-created Medicare Payment Advisory Committee (MedPAC), recommends replacing the SGR. Medicare reduces payments to physicians and other practitioners whenever program expenditures for their services exceed a set target, the SGR. At the same time, however, the government induces greater use of physician services through new coverage decisions, quality improvement initiatives and a host of other regulatory decisions that are good for patients but are not recognized in the SGR. Of particular note, the SGR does not properly account for investment in health IT. As a result, from 1991–2004, payment rates for physicians and health professionals fell 15% behind practice cost inflation as measured by Medicare's own conservative estimates. As such, ACP supports MedPAC's recommendation to replace the SGR with an annual update system which, like those of other Medicare providers, reflects actual increases in physicians' costs.

The solution to properly incentivize healthcare providers to invest in health IT is multilayered. Physicians and other health care providers need access to capital to make the investment in health IT. One way to do this is to create a government-backed loan program. The interest in EHRs among hospitals and physicians and the frequently cited financial barriers suggest that strong latent demand for these systems would be stimulated by capital availability. Cost offsets may be particularly beneficial to physician practices, independent hospitals, and other small organiza-

[11] Electronic Medical Records: Lesson from Small Physician Practices. Ihealth Reports. California HealthCare Foundation; October 2003.

tions such as public sector clinics and agencies, for which capital is particularly scarce and where cash flow inhibits investment in health IT and specifically EHRs. Loan funds should be made available for more than just the purchase of an EHR system, it must cover the cost of EHR purchase, implementation, training and concomitant workflow changes that are necessary to lower implementation risk and deliver results from EHR implementation. The program also should be structured so that health IT purchases support systems that promote national goals such as interoperability of healthcare data, not proprietary, unconnected health IT systems.

Once the investment capital is made available, the purchasers of these health IT systems must have a means to pay these purchases off. Therefore, Medicare and private sector payment policy must be changed to encourage, rather than discourage the use of health IT. The Medicare SGR formula must be replaced with a more coherent payment update formula and the Medicare RBRVS must explicitly pay for the use of health IT.

Legislative Recommendations

It's clear from the benefits discussed in this testimony that investment in health IT solutions are a sound investment for the future health and well-being of Americans. In order to stimulate investment in health IT, ACP recommends that Congress consider enacting legislation that will incentivize physicians to acquire HIT, including consideration of the following options:

1. **Create a revolving health IT loan program—modeled on the current student loan program—for physicians and other health care providers interested in investing in health IT with clinical decision support tools designed to be interoperable and to enhance medical practice to improve the quality of care delivered.**
2. **Create a grant program to provide direct dollar subsidies to physicians who agree to acquire health information technology linked to clinical decision support tools and who agree to voluntarily participate in performance measurement/quality improvement programs and/or in studies to assess the impact of such HIT systems on improving health care quality while achieving system-wide savings.**
3. **Authorize the creation of tax credits, specifically targeted to physicians in small and solo practices, for the purchase of HIT with clinical decision support, conditioned on an agreement by the tax credit recipients to participate in performance measurement/quality improvement programs and/or in studies to assess the costs and benefits of HIT linked to quality improvement.**
4. **Replace the flawed Medicare SGR formula for physician payment with a new formula that provides for recognition of the acquisition and ongoing costs associated with HIT systems.**
5. **Build into the Medicare RBRVS system an add-on code for evaluation and management (E/M) services to identify that the E/M service was assisted by an EHR with clinical decision support tools designed to be interoperable. The add-on code would increase payment for the identified service by an amount that not only recognizes the investment of dollars and practice resources required to acquire and maintain such technologies but also the ongoing system-wide value to Medicare associated with use of such technologies.**
6. **Recognize and separately reimburse telephone and e-consults (structured email communication between patient and physician or other health care provider) that result in a distinctly identifiable medical service.**
7. **Authorize Medicare payment of a "case management fee", which would provide additional reimbursement per patient per month for physicians who agree to acquire and utilize HIT with clinical decision support to manage and improve care of patients with chronic illness.**
8. **Exempt such additional reimbursement incentives from Medicare budget neutrality requirements. Because Medicare is likely to experience system-wide savings associated with an investment in HIT, creating on financial incentives to support the acquisition of such cost-saving technologies should not be subject to budget neutrality cuts.**

Conclusion

Organizations that invest in health IT generate benefits for their patients and for health care purchasers, but often realize lower revenue (e.g., prevented hospitalizations and reduction of redundant medical services) and increased costs from sup-

porting the health IT. Even if EHRs and other health IT products were free to purchase and use, and could be implemented in a risk-free manner, the financial consequences of the changes they induce in health care organizations slows adoption substantially because the current payment system incents providers not to adopt health IT solutions. The financial penalties of health IT and EHR use are a direct consequence of the obsolete reimbursement methods used by Medicare and private insurers. These methods of reimbursement are misaligned with society's needs and health care's mission, and require fundamental reform.

Statement of David G. Schulke, American Health Quality Association

I am David Schulke, Executive Vice President of The American Health Quality Association (AHQA) which represents the national infrastructure of Quality Improvement Organizations (QIOs).

The QIOs are a national quality infrastructure whose primary mission is to monitor and measurably improve the quality of health care delivered to Medicare beneficiaries and the general public by taking evidence-based health practices from the bookshelf to the bedside. QIOs, under contract with the Centers for Medicare & Medicaid Services (CMS), concentrate on systems of care, rather than the care delivered to individual patients. This systems approach improves the quality of care for all Americans receiving services from providers at health facilities that work with QIOs.

The QIOs have become systems change experts focusing on effective ways to bring about transformational change in our health care system. We believe that, when implemented effectively, one of the areas that holds great promise for truly transforming our health care system and improving the quality of care is health information technology (IT).

We applaud the Subcommittee for your work over the past few years that has recognized the inherent potential of IT, and we support your efforts to promote its widespread adoption and use. As you know, however, while the promise of IT is great, its proliferation to date is not.

To this end, I am pleased to say that beginning next year, the QIOs in all 50 states and the U.S. territories will begin to focus intensively on promoting the adoption, implementation and effective use of health information technology, starting with small to medium-sized physician offices. Thanks in large part to the Chairman Johnson, a promising effort led by the California QIO, Lumetra, is already underway to develop and implement a successful model for achieving these aims.

The Medicare Modernization Act promotes and supports IT adoption and use in several ways. In particular, Section 649 advances a previously unavailable avenue for promoting adoption and effective use—payment incentives for providers and practitioners to adopt and use IT to achieve better quality care.

Under the Doctor's Office Quality—Information Technology project, or DOQ–IT, which was codified and improved by Section 649, the QIOs in California, Utah, Massachusetts and Arkansas are working together to develop a model for improving office efficiency and patient outcomes by assisting small to medium-sized physician offices in their implementation of Electronic Health Record (EHR) systems. These QIOs are also working to ensure that practices use their EHR systems to the fullest capacity so that ultimately, physicians can use clinical data reports to monitor and improve their performance in several key areas of health care. In keeping with the Institute of Medicine's *Crossing the Quality Chasm* report, the primary aim of this model is to provide no-cost support and assistance to providers such that their IT systems help them improve patient safety and quality of care through the practice of evidence-based medicine. Those that do improve can be eligible for additional reimbursement from CMS.

QIOs have found overwhelming support for this endeavor from key national organizations such as the American Medical Association, the American Academy of Family Physicians, the American College of Physicians, the eHealth Initiative and the National Council on Quality Assurance. High level consensus to support the success of the QIOs' work in this area is critical, and we have received not only support, but a high degree of teamwork and consensus building from these organizations.

However, given the promise of positive outcomes, one of the questions we must consider today is why, when academic evidence exists that points to the ability of information technology to improve patient safety and health care quality, and to potentially hold down costs, is adoption so low? And how do we accelerate it?

To be sure, several barriers play a key role in preventing health care providers and practitioners from adopting and using IT. Lack of standards, upfront capital in-

vestment, perceived high physician time costs and difficulty integrating a new system into a physician's workflow and care process are obvious sources of resistance.

The focus of my testimony today will be in the area of what the QIOs can bring to bear in helping to overcome some of these key barriers.

QIOs serve as a national infrastructure for quality improvement in health care. These private sector organizations have strong local relationships with the providers and practitioners in their states. It is these relationships, coupled with the unique mix of skill sets, expertise, adaptability and proven track record of success that will enable the QIO infrastructure to help overcome some of the barriers inherent to the widespread use of information technology in health care—particularly in the area of implementation.

As Health Information Technology Coordinator Dr. David Brailer wrote in a research paper published by the California HealthCare Foundation last fall, "Unless substantial support is given, physicians will not be able to configure their systems, train for their use, integrate them into their workflow, and support the transition of their staff. In other words, if left alone, most physicians will fail at CPR [computerized patient record] implementation."

In looking at those health care organizations that have not failed, but who have succeeded in implementing IT and in actually improving patient safety, patient outcomes and health care quality, we find that they share at least one thing in common—the resources and effort up front to assess problems and inefficiencies in their practices and to subsequently redesign the way they manage and deliver care in order to address those issues. In other words, these successful organizations have utilized IT as a catalyzing path to the solution, but not the solution in and of itself.

Why is this process of systems redesign so important? Because simply buying an expensive IT system to integrate with an existing system that is inefficient and produces poor quality will only make for an expensive, inefficient and poor quality system. We must remember that the fundamental goal of IT is to achieve better quality outcomes for patients; its promise lies not in simply automating current practices, but in transforming them.

To achieve this goal, providers and practitioners need support—support that goes far beyond what IT vendors can and typically do provide. They need support from systems change experts who can help ensure that core processes are redesigned with the aim of quality and efficiency in mind. Providers also need support to ensure that they are utilizing their IT system to its fullest capacity, helping them engage in the type of care management that improves quality.

A 2003 research study by Drs. Miller and Sims of the University of California, San Francisco regarding the implementation of Electronic Medical Records (EMRs) indicates that the more time physicians invest in learning the system, making practice changes to complement the EMR and reorganizing their exam rooms and office workflows, the more financial and quality benefits they receive from EMR implementation. But perhaps the largest barrier in this area is a lack of resources to invest such time and energy. In fact, studies indicate that one of the largest barriers to IT adoption, after financial resources, is high physician time costs and physician resistance (Brailer and Terasawa, 2003. Miller and Sims, 2003).

This is one of the primary areas in which QIOs can contribute. QIOs serve as a no-cost resource of systems change experts who, thanks to the DOQ–IT project, will have studied the most effective methods for IT implementation and will apply those methods in their work with providers. It is our hope that QIOs offering these supportive resources will help make significant headway toward overcoming some of the key barriers to adoption and implementation of IT—particularly by helping to decrease demands on physician time, improve workflow and care process redesign, and decrease productivity loss associated with such redesign. In other words, we believe that this additional assistance can ultimately result in more widespread adoption and effective use of IT.

Finally, we must also be mindful of one potential adverse effect of promoting IT adoption and use. If left alone, without significant support or resources, it is likely that the locus of IT adoption will be limited to large physician group practices and health systems, creating a kind of digital divide where the promise of quality and efficiency offered by IT is realized only by those with the resources to support the level of effort required for effective implementation and use.

Referring again to the research paper written by Dr. Brailer, the rate of adoption in large urban areas appears to be one and a half times greater than in smaller, non-urban areas. The size of the physician practice also plays a key role. As Dr. Brailer notes, "—there are separate concerns about the growing CPR adoption gap between large, urban organizations and their smaller, non-urban counterparts."

Importantly, QIOs can also play a mitigating role in this area by focusing initially on small to medium-sized physician offices. By utilizing their existing local relation-

ships with these providers and practitioners, QIOs will work to encourage IT adoption and subsequently provide the kind of additional support these offices need in the area of planning, implementation and improvement. As QIOs achieve successes, we also hope to offer assistance to larger practices in the ambulatory setting and to providers of varying size and location in the inpatient setting.

On behalf of the national network of QIOs, we fully support your work to promote the widespread use of IT to improve health care quality in America. We agree that health information technology holds great promise for improving patient safety and outcomes when implemented in a way that is integrated with care management and workflow changes. We urge the Subcommittee to support innovative and effective models for supplying the assistance that providers and practitioners need to ensure that IT delivers on its promise of transforming quality in our health care system.

Statement of F. Lee Marston, Broadlane, Inc., San Francisco, California

I am pleased to be able to provide written testimony to this Committee on the topic of technology advances in healthcare. While most people think of clinical applications in this regard, Broadlane is introducing sophisticated technologies to the back offices of hospitals, physician offices and other clinical settings. These technologies will help advance the quality of care, while also bringing cost savings and efficiencies—already enjoyed in industries from computing to automobile manufacturing—to healthcare providers.

My name is Lee Marston and, as chief information officer, I head Broadlane's health information technology efforts. Prior to joining Broadlane, I was chief information officer at Owens & Minor, the nation's largest distributor for name-brand medical/surgical supplies. I also held senior management consulting positions with Arthur Andersen & Co. and CSC Consulting and have been a frequent guest lecturer at Georgia Institute of Technology on the subject of information technology's role in the supply chain.

Broadlane's Healthcare Business Solutions

Broadlane began in 1999 with the mission to provide group purchasing and supply chain management services to hospitals in an effort to increase efficiency and dramatically lower supply costs for our provider customers. Over four years, Broadlane's value proposition has evolved to pair innovative health information technology with best practice business process expertise in strategic sourcing, contracting and procurement that deliver powerful savings for our provider customers. By taking accountability for these services, leveraging economies of scale and working in close partnership with customer physicians, nurses and other professionals, we are proud to have delivered dramatic cost savings that lead the industry. Our services have resulted in millions in audited savings in areas accounting for over fifty percent of the operating costs faced by hospitals—supplies, capitol equipment, purchased services and temporary labor.

Our business model and suite of services have been well received in the market, with more than 800 acute care hospitals and 3,400 sub-acute care facilities now counted among Broadlane's customers. Broadlane customers range from some of the largest not-for-profit and for-profit delivery systems in the country to stand-alone community hospitals, along with thousands of individual physician practices. Broadlane is headquartered in San Francisco with offices in Oakland, California; Cincinnati, Ohio; Dallas, Texas; and New York City, New York and has grown from 30 to more than 400 employees in about four years.

Broadlane's Unique Back Office Health Information Technology Solutions

The hospital supply chain presents enormous opportunities for the application of modern technology to increase efficiencies and effectiveness around daily business processes. Many hospitals struggle with constantly changing medical product technology, non-standard product pricing from suppliers, and disparate purchasing systems across multiple facilities. Errors, waste and missed opportunities abound.

Broadlane addresses these back-office supply chain challenges through innovative health information technology solutions that links e-procurement and automated data analysis in a real-time environment, allowing us to accurately capture hospital purchase history, ensure correct prices are being paid, and help identify new products that are candidates for group purchase contracts. Broadlane is one the first companies providing this type of service to healthcare providers. To enable this new service, Broadlane has integrated our highly successful and intelligent e-commerce exchange called **BroadLinkä** with our Web-based **contract management system**.

Contract Management System

BroadLink is an e-commerce business to business exchange that electronically links hospitals to their suppliers to manage all transactions involved with supply procurement, including purchase orders, purchase order acknowledgements, advance ship notifications, invoices and product and price updates. Our automated solution virtually eliminates the need for hospitals to manually place orders via telephone or facsimile. In doing so, BroadLink speeds the purchasing process, reduces manual errors and serves as a support mechanism for the functionality resident in Broadlane's contract management system.

Today more than 375 hospitals are connected to BroadLink, which currently processes more than $8.3 million in customer purchase orders daily and is projected to process approximately $2 billion in purchase orders this year.

Contract Management System

Broadlane's contract management system is one of the most advanced systems available today for contract management in healthcare. It extends the capabilities of the BroadLink engine by taking the e-commerce information and adding automatic data analysis and real-time, actionable reporting capabilities.

The contract management system houses provider contract data in a central repository while continuously connecting to the BroadLink exchange to capture and store transaction data, ensuring that e-commerce transactions are verified against the provider's contract data in a real-time environment. Our contract management system helps ensure purchase order pricing accuracy, which in turn helps hospitals eliminate overpayment of invoices, take advantage of all available discounts and rebates, ensure compliance with all contractual agreements, reduce administrative time, shorten the purchasing transaction cycle and access accurate historical purchasing information.

Broadlane's contract management system does not require a hospital to purchase software, as it is a web-based solution that hospitals can access via an Internet browser. It is highly secure and customizable. The contract management system's application service provider (ASP or Web-based) approach accommodates a variety of different ERP and material management systems used by many healthcare providers. Broadlane guides hospitals through a comprehensive implementation and training process, coupled with ongoing customer support. We are proud of our unique, integrated approach.

Brief Description of Broadlane's Products and Services

In addition to our health information technology, Broadlane provides additional complementary services to our customers in the areas of:

Supply Chain Services: Broadlane uses a unique customer committee-driven approach to product selection and contract management. We combine this approach with our clinical and operational expertise to help implement contract compliance and utilization strategies that achieve both measurable savings and physician satisfaction. For customers who want to take advantage of the greatest overall cost savings opportunity, Broadlane will take responsibility for the entire materials management function—our highest level of supply chain service.

Purchased Services: Broadlane provides additional services to help customers solve particularly vexing cost management challenges in the purchase of non-medical services and supplies for areas such as energy, telecommunications, transcription, information technology and professional services.

Labor Services: Broadlane has become the leading provider of temporary labor agency contracting and management services to the healthcare industry. Our contracting expertise and advanced health information technology can finally help attack the soaring fees associated with the burgeoning use of temporary staffing agencies, while ensuring the quality of contract labor staff. Broadlane's unique sourcing technology, ProSource, helps rationalize customer's temporary labor contracting process. This technology allows a nurse supervisor, sitting at his or her desk, to use a web-based tool for finding, ordering, tracking and paying for exactly the right highly trained and experienced nurse for the specific department needed, at a substantially lower hourly rate.

Conclusion

Broadlane remains committed to helping advance health information technology, for our customers and all participants in the healthcare system. These advances are already increasing efficiencies, lowering costs and improving the quality of care. Our customers are seeing real results and cost savings. As this technology is adopted throughout the health care system, others can also enjoy these savings as well.

Thank you for considering my written statement.

Statement of Guidant Corporation

Guidant Corporation advocates public policies that foster timely patient access to care, promote the viability of healthcare systems founded on principles of competition and choice, and encourage private sector investment in innovation. It is our belief that healthcare information technology (IT) can play a significant role in achieving these goals.

Headquartered in Indianapolis, Indiana, with manufacturing and/or research and development facilities in the states of Minnesota, California and Washington, as well as in Puerto Rico and Ireland, Guidant Corporation is a leading designer and manufacturer of medical technologies used to treat primarily cardiovascular and vascular illnesses. Guidant's products save and enhance lives around the world.

Today, Guidant Corporation employee-owners play leadership roles in groups dedicated to increasing the role of IT in healthcare, including the Healthcare Leadership Council, National Alliance for Health Information Technology, eHealth Initiative and Healthcare Information and Management Systems Society. We also support the establishment of system interoperability for information management systems to allow for enhanced integration, data exchange and reporting capabilities. As such, we are committed to the development of standards and are an active participant in Health Level 7.

Currently, companies including Guidant Corporation are working to seamlessly integrate data from an implantable cardiovascular device into a patient's electronic medical record so that clinicians can quickly determine a patient's condition and make timely therapeutic adjustments. Such technologies will enable patients to be monitored regularly with less inconvenience, and also allow physicians to detect problems at an earlier stage, thus reducing potentially expensive hospitalizations. The Congress recognized the promise of such innovations when it included chronic care improvement provisions in the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA) (P.L. 108–173). We look forward to working with the Congress and the Centers for Medicare & Medicaid Services (CMS) to ensure the successful implementation of these provisions.

As the Congress and the Administration work to advance health information technology, Guidant Corporation urges that policies adhere to the following tenets:

- Be founded on principles of, and promote, market competition;
- Incorporate transparent processes and rules; Advance information sharing;
- Encourage adequate provider reimbursement by recognizing clinical and economic value along the continuum of care;
- Promote the adoption of industry standards and provide funds to support interconnectivity; and
- Minimize liability concerns and eliminate barriers to the exchange of data within the private sector.

A brief explanation of each of the tenets cited follows.

Promote Market Competition

Guidant Corporation believes that while health IT standards are clearly needed, a one-size fits all model will not work given the range of healthcare providers having vastly different needs and capabilities with regard to health IT. Competitive markets are best suited to keep up with rapid changes in health IT innovation. As consumers and private purchasers become more aware of the quality- and cost-related benefits of electronic medical records, they will migrate to those providers and facilities that make the most effective use of these technologies. Successful adoption of health IT that accounts for the particular needs of individual providers and health plans can be a significant source of market advantage and also spur competition.

Incorporate Transparent Processes and Rules

Guidant Corporation and the medical technology industry generally have significant experience with both the FDA approval process and Medicare coverage process. We know that providers, patients and medical technology innovators are best able to contribute to the development of sound regulations and policies, when the rules—and the standards upon which they are based—are clear. In fact, transparent and predictable policy processes allow businesses, including providers and innovators, to consider government decisions in business planning, thereby incenting private in-

vestment. Given its complexity, it is imperative that transparency and predictability be the hallmarks of any federal government involvement in health IT policy.

Public-private conferences such as the planned July 2004 National Health Infrastructure Summit—which is well publicized and invites the participation of a wide range of stakeholders—are a good start. HHS should publicize the findings of this conference and inform the public how they will be used.

Advance Information Sharing

Guidant Corporation recognizes, as experts have testified before this subcommittee, that there exists in the U.S. healthcare system quality issues with could be ameliorated, at least in part, by better information at the point of care. Access to such information is often best achieved by the use of health IT including electronic medical records accessible to all care providers who need them. For example:

- The potential savings from reducing excessive spending on services of little or no value is estimated to be as much as 30% of current Medicare spending levels. [Source: E.S. Fisher et al "The Implications of Regional Variations in Medicare Spending," Parts 1 and 2, *Annals of Internal Medicine,* 138, no. 4 (2003)]. For instance, recent news reports indicate that a significant percentage of women who have had hysterectomies continue to get pap smears. A robust system of electronic medical records could flag such cases and reduce the use of such unnecessary treatment.
- The healthcare system is also hurt by underuse of known effective treatments, e.g. beta blockers for myocardial infarction, etc. A recent study found that adults receive only about half of recommended care leading to increased complications, morbidity, mortality and costs to the healthcare system. Electronic medical records could also serve to prompt the provision of medically necessary care, including preventive services. [Source: E. A. McGlynn, "The Quality of Health Care Delivered to Adults in the United States," *New England Journal of Medicine,* Vol. 348, No. 26 (2635–2645), June 26, 2003.]
- It takes approximately 17 years for new knowledge in clinical trials to be incorporated into every day medical practice because no information infrastructure now exists to help clinicians easily apply that research at the point of care. Electronic medical records could highlight the relevant findings of clinical trials in a given patient's record. [Source: Markle Foundation, Connecting for Health, The Steering Group, *Key Themes and Guiding Principles,* June 5, 2003.]
- Physicians spend an estimated 20–30% of their time searching for and organizing information; robust electronic medical records could ensure that providers have the information they need at hand. [Source: eHealth Initiative]

Encourage Adequate Provider Reimbursement

Guidant Corporation believes that physicians and other providers need to be incented to incorporate health IT into the practice of medicine. Currently, Medicare does not generally reimburse for services provided electronically. For example, while several new advanced patient cardiac remote monitoring technologies have been introduced in the last year, there is not yet standardized payment for the physician's time, effort, and investment in IT, and in many states the service is not covered at all. This provides a disincentive to adopt and integrate the technology for many practitioners. We support the creation of new CPT codes to facilitate appropriate payment for remote IT-based services.

Promote Industry Standards and Provide Funds

Guidant Corporation applauds the Administration's efforts to promote the development of private-sector health IT standards. Given the federal government's existing purchasing power, Secretary Thompson's March 2003 announcement that all federal health programs will begin to use such standards is a significant development, as is the May appointment of the nation's first healthcare IT coordinator.

We urge the Congress to fund the President's budget request for health IT. This will make available seed money to providers to promote the adoption of private sector standards.

Minimize Liability Concerns

Guidant Corporation understands that liability concerns may curtail the adoption of health IT. Specifically, some physicians are believed to be concerned that the greater information exchange allowed by health IT could increase their liability exposure. Such concerns may disincent the adoption of remote monitoring and other systems that allow the more frequent monitoring and management of patient's care.

We urge further study of this issue and suggest that provisions addressing health IT be specifically included as necessary in future medical malpractice reform proposals.

We ask that this statement be included in the hearing record and would be pleased to address any questions.

Statement of Mary Griskewicz, Healthcare Information and Management Systems Society Advocacy and Public Policy Steering Committee, Chicago, Illinois

BACKGROUND:

Madame Chair, Congressman Stark, and distinguished members of the Subcommittee, I am honored to submit this statement for the record. My name is Mary Griskewicz and I have the pleasure of serving as the 2004–2005 Chair of the Healthcare Information and Management Systems Society (HIMSS) Advocacy & Public Policy Steering Committee. I live in Connecticut and work professionally for IDX Systems Corporation as a Regulatory & Compliance Program Manager.

HIMSS vision is to ***advance the best use of information and management systems for the betterment of healthcare.***

On behalf of the HIMSS and the thousands of professionals in the healthcare information technology community, we want to commend you and your Subcommittee for your leadership role in promoting initiatives that increase the use of information technology throughout the healthcare sector. In particular, Madame Chair, we know personally of your commitment to this cause as was reflected during your remarks at our congressional reception where you were presented with the 2003 HIMSS Advocacy Award.

HIMSS and our Healthcare IT community colleagues are thankful for your efforts to highlight our shared goal of utilizing a National Health Information Infrastructure (NHII) to seamlessly transmit electronic healthcare records (EHRs) to improve patient safety and healthcare quality.

As you are well aware, in the past year alone, healthcare IT has taken a major leap forward. The federal government's support of the Institute of Medicine (IOM)/ Health Level Seven (HL–7) efforts on EHR functional model and standards, sponsorship of the November 2003, IOM report, *Patient Safety, Achieving A New Standard of Care*, establishment of the National Health Information Infrastructure (NHII) Office and the Council on the Application of Healthcare Information Technology (CAHIT), release of the AHRQ $41M Transforming Healthcare Quality Through Information Technology grants, and most recently the appointment of a National HIT Coordinator have underscored the importance of healthcare IT and the impact healthcare IT can have on both lives saved and costs avoided.

Today's hearing is focused on what further initiatives are needed to increase the use of information technology and management systems throughout the healthcare sector. We have highlighted seven next steps that we believe could help us reach our ultimate goal.

NEXT STEPS:

1. President Bush has requested doubling to $100 million the money spent on projects that use promising health information technology in the FY 2005 President's Budget Request. This funding would encourage the replacement of handwritten charts and scattered medical files with a unified system of computerized records. To quote the President from his 1/24/04 radio address: "And fifth, we can control healthcare costs and improve care by moving American medicine into the information age." We encourage the Congress to support this budget request for utilizing technology to improve healthcare.
2. Ensure that all funding appropriated for demonstrations is consistent with the overall vision for the NHII, as articulated by the National Committee for Vital & Health Statistics.
3. Last year, Madame Chair, you submitted HR 2915 to provide for a National Health Information Infrastructure (NHII) and data and communication standards for health Information system interoperability. This legislation has been co-sponsored by Reps. Burgess, Cooper, Greenwood, Kennedy, Nussle, Shaw, Weldon, Shays, Castle, English, Harris, Norwood, Ramstad, Nussle, Ryan and Walsh. We encourage the Congress to pass this legislation to permanently create an office reporting directly to the Secretary of Health and Human Services

to coordinate national health information technologyto allow electronic health records to be seamlessly transmitted.

4. We must learn how to blend the health information technology (HIT) solutions already realized by the Departments of Defense and Veterans Affairs with those being developed under the umbrella of the Department of Health & Human Services. These solutions can serve as the tipping point for private sector initiatives.
5. We recommend that the federal government focus attention on funding the rapid completion of critical healthcare standards by key standards development organizations. Standards are a critical step towards the realization of portable and interoperable electronic health records in the United States. Without standards, we will not achieve our mutual goal of improving the quality, safety, and cost-effectiveness of patient care.
6. We recommend that the federal government focus attention on the consistent implementation of standards. Such attention would take the form of endorsing and partially funding the development of implementation guides for the portability and interoperability of health information. While the acceleration of standards development is critical, standards alone are not sufficient. To ensure the consistent, industry-wide implementation of such standards, we ask you to endorse and support the industry-backed "Integrating the Healthcare Enterprise" (IHE) process for enabling the accessibility, interoperability and portability of secure patient information. IHE is a proven, standards-based, vendor-neutral process that publishes its solutions in the public domain.
7. Finally, we appreciate the federal government's dedication of proposing expanded resources to deploying healthcare information technology. We hope the Congress will encourage the Administration to use the current funds (in addition to the $50M proposed for healthcare IT demonstration projects being funded by AHRQ) for widely disseminating the lessons learned and encouraging care providers to implement EHR solutions. We believe the demonstration projects currently underway or in development will yield significant knowledge for implementing EHRs and know that the time is ripe to take action on the outcomes. The Office of the NHII can provide leadership in helping care providers across the health spectrum best understand how to: (1) evaluate their setting's need for healthcare ITsolutions; (2) select the best solution; (3) implement that solution and change the human processes to best utilize it; and, (4) evaluate the return on investment.

CONCLUSION:

We believe that these seven steps will greatly help us reach our goal. We have noted that over the past 24 months, the interest and attention on health information has exploded. Those of us who have been in this industry for any period of time are both gratified by, and wary of, this attention. Health information—primarily in the form of both portable and interoperable health records—offers a key to improving the quality, safety, and cost-effectiveness of patient care. That being said, HIMSS also recognizes that technology is only as good as the human processes and systems adopted to utilize the technologies.

As you proceed forward in the months and years ahead, the 14,000+ individual HIMSS members and over 240 corporate HIMSS members representing over 1,000,000 employees are committed to working with you and others to make our shared vision of the widespread adoption of information technology and management systems in the healthcare sector a reality. Please don't hesitate to contact us at anytime at advocacy@himss.org.

The Kryptiq Corporation
Beaverton, Oregon 97006
June 30, 2004

The Honorable Nancy L. Johnson
United States House of Representatives
Washington, DC 20515

Dear Chairwoman Johnson:

Thank you for the opportunity to provide written comments regarding the Hearing on Health Care Information Technology held June 17, 2004.

At Kryptiq, we believe the adoption of technology is central to addressing the current healthcare cost crisis in our country. We have been developing technology for

the private sector and recognize the difficulty of achieving industry-wide benefits without significant efforts on the part of the federal government. Your plan accurately recognizes the adoption of information technology in healthcare as critical to increasing both quality and efficiency in healthcare. Your committee has also heard testimony which identifies one of the greatest barriers to IT adoption, namely the lack of interoperability among existing systems already in use today. Driving use of standards is the best way to ensure data is made available where and when it is needed. Federal initiatives have the potential to produce dramatic and positive changes in the U.S. healthcare industry.

Kryptiq provides solutions that enable standards-based information sharing across healthcare. Our solutions improve quality by enabling online patient care and increase efficiency by integrating solutions with existing clinical information systems (e.g. electronic medical record systems) to accommodate existing physician workflow.

In order to deliver on the stated objectives of improved quality and efficiency, we encourage you to consider the following two suggestions:

1. **The definition of Local Health Information Infrastructure (LHII) should focus on a community's ability to share information electronically among health care entities, irrespective of any formal independent organization. While LHIIs may be managed by independent organizations responsible for maintaining the communications infrastructure, this is not necessary and should not be legislated.**
2. **Payment systems need to be considered for emerging care practices that are enabled by adoption of IT with a particular emphasis on ambulatory care.**

Explanations of these suggestions are attached.

We admire your efforts to advance the adoption of information technology in healthcare and look forward to the opportunity to participate in this process.

Sincerely,

Luis Machuca
Chief Executive Officer

Submission to Congressional Record regarding the Hearing on Health Care Information Technology held June 17, 2004.

The definition of Local Health Information Infrastructure (LHII) should focus on a community's ability to share information electronically among health care entities, irrespective of any formal independent organization. While LHIIs may be managed by independent organizations responsible for maintaining the communications infrastructure, this is not necessary and should not be legislated.

Currently, the definition of LHII is restricted to an "independent organization of health care entities established for the purpose of linking health information systems to electronically share information." Technologies exist today that enable healthcare organizations to establish information sharing networks without first establishing a central governing or maintenance body. These technologies allow organizations to become part of the network simply by adopting the technology. For example, deploying integrated clinical messaging for EMRs based on the emerging Continuity of Care Record (CCR) standard enables direct electronic communication of patient information among providers. Such technologies show great promise to affordably connect healthcare patients, providers, and payers in a manner that can be easily adopted by any size organization.

Payment systems need to be considered for emerging care practices that are enabled by adoption of IT with a particular emphasis on ambulatory care.

To ensure quality and efficiency in healthcare, it is important that payment systems reflect current best practices within the industry. Payment systems should be considered for emerging care practices that are enabled by adoption of IT, such as virtual encounters that have the capability to displace office visits and enable remote clinical monitoring. Ambulatory care reaches the greatest number of people and has the largest impact on rural and underserved markets. Ambulatory care is the most underinvested segment of healthcare in the area of IT. Meanwhile, it has the greatest potential for reducing costs and improving care on a broad basis. By encouraging emerging care practices in the ambula-

tory setting, these structures will have a significant impact on adoption of IT and will reduce healthcare costs for all involved parties.

Significant attention in the industry has been paid to the idea of "pay for performance". Until now, this notion has gained little momentum due in large part to a lack of supporting payment structures. It is important to consider payment structures that would provide incentives to providers for demonstrating quality performance based on electronic tracking and reporting of standardized quality measures. Analyzing and implementing these structures will provide a foundation for "pay for performance" and will greatly motivate providers to adopt technologies that will improve quality and efficiency of care.

Statement of Luis G. Kun, Washington, DC

My name is Luis Kun, Ph.D. and am a Professor of Systems Management at the IRM College of the National Defense University. Last year I was asked by Susan Christensen (the Senior Health Policy Counsel for Representative Johnson) to send any comments I had with respect to HR 2915 / the NHII.

On February 24 I sent the attached letter, which reflected my views. When I noticed this hearing taking place, I decided to forward you this letter since I believe that my comments may be useful to you.

Representative Nancy L. Johnson
2113 RHOB

Dear Representative (Nancy) Johnson

I would like first of all to congratulate you and your staff on putting forward in the 108th Congress the Bill HR2915, to provide for a National Health Information Infrastructure (NHII) and data and communication standards for health information system interoperability. Your efforts should be applauded for addressing a need that will enhance the lives of all Americans now and in the future.

This Bill addresses first leadership, i.e., National Health Information Officer. I concur that this is a crucial issue for success and needs to be high on the priorities list for a successful implementation of a NHII.

I will describe three major issues, starting with a recommendation then providing a current and/or future environment, and finally posing some questions. The information that follows is my own opinion. It does not represent the Committees/Working Groups that I chair nor my employer (i.e., IRMC / NDU, DOD or the US Government).

SUGGESTIONS for Issue #1 Goals and Objectives: HR–2915 addresses particularly the "institutional" environment and somewhat the provider environment, but not the patient/consumer one. The NHII should incorporate in its goals issues regarding the patient/consumer, the health care provider and the institutions involved in the process. The NHII should provide guidance in getting to a patient centered system.

Issue 1: ***Goals and Objectives***

- The goals of this NHII vision seem to apply only a subset of health related applications where the focus is oriented towards the clinical environment (i.e., maximize outcomes, minimize medical errors especially in hospitals and in the administration of contraindicated drugs, reduce redundant paperwork such as the repeated taking of patient histories, decrease costs from repetitive testing, establish a compatible information technology architecture that increases health care quality and cost-savings, enhances security of information, and avoids the financing and development of health information technology systems that are not readily compatible.) Although these goals address some current needs, they seem to be more reflective of an environment we had in the eighties and early nineties where the focus was the hospital-centered environment and not the current one, i.e., patient/consumer centered.
- **Current environment-background:**
  - Consumers that not only are more educated and have more information available to make (better) decisions, but an environment that permits them do consultations before, during and after a health related situation arises. This allows them for example to be better prepared for an appointment which possibly translates into better outcomes.

- Many other consumers (and their relatives) that lack the access, or the understanding of content (i.e., their main language of communication may not be English, their reading ability/education level and/or understanding may be much lesser than others) will be at a disadvantage (Digital Divide).
- Many consumers for example are managing their health via the Internet. They may use the system [i.e., computer and/or TV] to/for:
  - Consult with their physician and/or nurse regarding their health.
  - Plan their diets.
  - Have customized exercise routines planned and managed via the network (through their TVs).
  - Purchase their drugs via the Internet (and sometimes self administer them).
- Health care providers that:
  - Do consultations through mobile devices with colleagues and/or libraries located anywhere in the world.
  - Educate themselves through distance learning curricula, and/or access important and most current needed information (i.e., clinical guidelines, prevention guidelines, etc.) from the US and/or abroad.
  - Perform Telehealth visits anywhere in the US and/or abroad.
- May do homecare visits (real and/or virtual) for the elderly with chronic diseases.
- Institutions that need an Information Technology Infrastructure to support (technologically) their staffers in all the related activities mentioned above. This requires resources, training, education and competency.

Some questions:

1. How will the NHII deal with consumers?
2. What are the consequences for consumers from using the NHII?
3. How many "health/medical" related errors are consumers committing with the self prescribing and self administration of drugs? i.e., If the issue is "medical errors" what about all the consequences from self-diagnosing/self-administering drugs/prescription coming from questionable sources.
4. Since the price of drugs is constantly escalating, many, particularly the elderly can not afford buying drugs the "conventional" way. Many pursue cheaper alternatives via the Internet/World Wide Web (WWW). What is the number of people that are self prescribing, purchasing and administering drugs and what are the consequences?
5. How can we assure the quality of the information read on the Internet/WWW? i.e., How reliable is the information consumers get on the Internet and how can the NHII make it better?
6. How can we assure the quality of the drugs [bought outside] they may purchase for example through e-Commerce?
7. How reliable are the products ("quality assurance") purchased through the Internet? i.e., where are these drugs manufactured?
8. How can reliability of (Internet/WWW) purchased drugs be assured?
9. How will the NHII address the population that is either undereducated (can not read), unemployed (can not access) or can not understand what they read (content-intellectually handicapped)?

SUGGESTIONS for Issue #2 Stakeholders / Partnerships:

1. Both DOD and the VA should be part of a team that builds the NHII.
2. The USDA, EPA, DOE, and DHS and perhaps other stakeholders need to be at the table to help define their requirements for the NHII.
3. The FDA, CMS, the CDC, HRSA, Indian Health Services, etc. need to be part of the team building the NHII.

Issue 2: *Stakeholders / Partnerships:* Under Section c) Collaboration with Stakeholders; item (3) Parties Represented.

The Bill names: (A) The National Committee on Vital and Health Statistics, the National Institutes of Standards and Technology, the National Library of Medicine, and the Agency for Healthcare Research and Quality. (B) Individual and institutional health care clinical providers, including a teaching hospital and physicians. (C) Clinical and health services researchers. (D) Health care purchasers. (E) Private organizations with expertise in medical informatics. (F) Patient groups. (G) A State or local public health department. (H) The health care information technology industry and national alliances formed to achieve standards-based health care information systems.]

Current environment:

- The VA has a network of 165 + hospitals interconnected using electronic records (VISTA) of their patients (about 5.000.000) throughout the nation.
- The armed forces not only are in a similar predicament as the VA but they actually use throughout the world their resources, i.e. electronic health records, clinical decision support, telemedicine / Teleconsultation, etc.
- DOD has developed the Government computer-based patient record (GCPR).
- If a terrorist event (i.e. a biological, chemical, nuclear/radiological, cyber) or a natural disaster occurs then Department of Homeland Security needs to be involved (i.e. Emergency Management /FEMA).
- If the terrorist event involves the air/water, chemicals, food, nuclear radiological threats then the EPA, USDA, DOE would need to get involved.
- Users go to the FDA and CMS (HCFA) to get answers regarding regulatory matters, i.e. drugs, procedures, payments, etc.
- Users go currently the Centers for Disease Control and Prevention since it is the agency that addresses Public Health and disease prevention issues.
- Users go to HRSA and Indian Services for specific type of information.

Some questions:

1. Will this NHII be used only on "peace" times? Or also during times of crisis?
2. How can the NHII be used during major natural catastrophes / events, i.e., earthquakes, floods, tornados?
3. How can the NHII be used during times of war and/or major man made crisis, i.e., wars, terrorism threats, etc?
4. Shouldn't the VA be a partner in the NHII / "national" solution?
5. Shouldn't the DOD be a partner in the NHII / "national" solution?
6. Shouldn't the DHS be a stakeholder on the NHII?
7. What if the health issue is regarding the food, chemicals, nuclear/radiological, water/air?
8. Should the USDA, EPA, DOE also be involved in the development and maintenance of the NHII?
9. Should the owners of the government computer-based patient record (GCPR) be able to use the NHII?
10. Shouldn't the FDA, CMS, CDC, HRSA, Indian Health Services, etc. be partners in the NHII?

SUGGESTIONS for Issue #3 Globalization, Standards and National Security

1. International standards organizations need to be part of the NHII definition team.
2. The World Health Organization (WHO), the Pan American Health Organization (PAHO), the European Commission (and the likes for Asia, Africa and Oceania) need to be part of the proposed solution.
3. Following steps 1 and 2 will allow the US to do effective epidemiology and surveillance of all infectious diseases which can appear anywhere in the world and affect our own population.

Issue #3 Globalization, Standards and National Security:

Current and future environment: The Bill ignores that we live in a global economy and many of the consequences of globalization. In particular it ignores the fact that both consumers, and health care practitioners in this Information Age, have a very different behavior than in prior times.

- The globalization effects of Internet and the WWW pose many unanswered question beyond "quality of the information read". Treatments and/or other alternatives can be sought outside the US borders.
- US citizens can do consultations with foreign practitioners from the comfort of their homes and/or offices.
- The US healthcare providers can consult, diagnose, treat, (i.e. generate business) "electronically" anywhere in the world from anywhere in the US.
- US citizens becoming sick while traveling abroad could benefit from using their personal health information in local (foreign) institutions. For these institutions to be able to read their records, will require for us (the US) to use identical standards (not just nationally but internationally).
- According to the census, the US population growth occurs from immigration. In many cases these individuals bring along medical histories and paper records. In some cases they bring them in electronic form. It would greatly enhance the

lives of this very large population if their prior records could seamlessly be incorporated into new electronic records generated in this country.

- Infectious diseases are by far one of the worst threats to the world population. [For example every 30 seconds a child dies from malaria]. It is a matter not only of Public Health but one of National Security. Healthcare is part of the National Critical Infrastructure and therefore the NHII will become part of it.
- Surveillance and epidemiology of Public health threats can be better achieved when information can be shared at the global level. Examples: In 2003 alone SARS, West Nile Virus, Monkey Pox, Mad Cow Disease, etc. This requires for us and the rest of the world to use a common infrastructure and standards for the exchange of critical information. The NHII should be a subset of the Global Health Information Infrastructure.

I appreciate the opportunity to offer you my opinion. If I can be of further help do not hesitate in contacting me.

Sincerely yours,

Luis G. Kun, Ph.D.

Medistore
Houston, Texas 77042
June 28, 2004

Committee on Ways and Means
1102 Longworth House Office Building
Washington, DC 20515

Dear ladies and gentlemen:

Our Nation's goal of every man, woman and child in the US having a life long electronic health record (EHR) by 2014 is achievable if the right approach is taken. The pages that follow address the issues and possible solutions associated with the take up and use of information technology in healthcare. Before I discuss the issues and possible solutions I would like to tell you of some of my experiences with information technology in another industry, which I think will help clarify some of the issues that our Nation's healthcare system faces today and in the future.

My background includes working in the petroleum industry for 29 years during which time I was involved in applying information technology to improve the profitability of the company's for which I worked. I worked in British Petroleum management for twelve years in operations, research, information technology and strategy and planning. After leaving BP I co-founded a software solutions company in the petroleum industry.

For the past two years I have been involved in healthcare information technology. I am currently a member of the Great Houston Partnership Public Health Task Force, which is charged with working with the private and public sector to create public clinics and a Local Health Information Infrastructure in Houston.

For a reference frame I would estimate the petroleum industry is at least 5 to 10 years ahead of the healthcare industry in the use information technology to run their business. Nearly every petroleum company large and small uses information technology to make decisions on a daily basis. There are many lessons we can take from the petroleum industry in healthcare.

You may ask, what can the petroleum industry possibly have in common with healthcare. Here are just some of the similarities that I have found during the past two years of studying healthcare.

1. Both industries have a large number of highly specialized experts who need to access and share information to make timely and accurate decisions about a specific individual entity (patient, oil well).
2. Both are information businesses that have traditionally been paper based.
3. Both are very conservative and resist change.
4. Patients and oil wells have long lives and large amounts of diverse information is collected and used over many years to make decisions about them.
5. Patients and oil wells are dynamic and may change unexpectedly.
6. Preventive maintenance is necessary to increase longevity, lower cost and improve quality.
7. Patients and oil wells undergo diagnostics and treatment.
8. Interventions are required at various times.
9. Much of the information is collected in a digital form and then output to paper to be analyzed and shared. For example real time monitoring, labora-

tory measurements and imaging are three prime examples of similar types of information.

10. Studying an individual or groups of individuals can assist in developing new diagnostics and treatments.

The one paramount difference between the two is that in the petroleum industry when a mistake is made due to lack of information in the decision process it can have a negative economic impact, whereas in healthcare, lack of information in the decision process can be the difference between life and death.

Petroleum Industry Lesson Learned.

While at BP, I was instrumental in co-founding the Petrotechnical Open Software Corporation (POSC) in 1990. This company was founded to solve the problem of accessing and sharing information intra and inter-organization on a global basis. Within two years this company had 134 members from around the world from the private and public sector, including the US Department of Energy, US Department of Interior and US Department of Defense. The company and its members took a standards approach to solving the problem of accessing and sharing information. Within 3 years the company had defined and agreed a set of free published standards for hardware, operating systems, telecommunications, a common dictionary of terms, a set of grammatical rules to share information and a common way to share information between applications. The project was an information technology success, but has had limited economic success and use.

The four primary reasons for limited success were:

1. There was an existing large investment in vendor and proprietary information technology in the petroleum companies, government agencies and vendors. It was basically cost prohibitive to move to the POSC standards.
2. The majority of the petroleum companies, government agencies and vendors did not have the resources to migrate their data or rewrite their applications.
3. The software vendors did not have any financial incentive to rewrite their applications, to access the petroleum companies or government agencies data in a POSC format or to have common standards with their competitors.
4. The highly specialized experts had to change the way they were doing their jobs and did not want to go through the change process.

The majority of the member organizations did not take up the POSC specified standards. The organizations that did move to the POSC standards were some of the nationally owned petroleum companies and government agencies. Those that did take up the standard was because they had the resources and could mandate the cultural change. Since healthcare involves both the private and public sectors and they work together I would suggest that STANDARDS are not a viable commercial solution to the problem of accessing and sharing information in a competitive industry like healthcare.

During my tenure as Chairman of POSC I realized that the commercial solution to the problem of sharing information was to create technology that accessed information where it resides. In 1994 I co-founded The Information Store, which delivers secure information in context intra and inter-organization via intranet, extranet or Internet from a multitude of information sources anytime and anywhere to those so authorized.

Solution and Benefits for Healthcare

From the lessons learned in the petroleum industry, the solution is accessing healthcare information where it resides and delivering it in the context of the caregiver.

Solution:

1. Access information where it resides.
2. Use Internet technology to make the information connections to existing information sources.
3. Deliver information in the context of the caregiver—familiar and useful form.
4. Since most patients interact with multiple providers in multiple locations during their life, it is necessary to have transparent access to those multiple providers and locations by the caregivers and patients (intranet, extranet, and Internet technology provides this flexibility).

Benefits:

1. Leverages the prior investment in information technology by the hospitals, clinics, pharmacies, laboratories, government agencies and vendors i.e. it is cost effective and does not disenfranchise previous investments in information technology and people (the approach is low cost and fast).
2. Requires very limited additional human or capital resources.
3. There is very limited change in the way physicians, nurses, pharmacists, researchers, laboratory technicians, and others do their jobs because the information is being delivered in a familiar and useful form where and when they need it. (minimum disruption, cultural change and training).
4. Limits changes on the part of the Information Technology organization i.e. they are still maintaining and supporting their current systems.
5. Easy to introduce new information systems (just connect the new information source).
6. Easy to access and share information intra and inter-organization (hospitals, clinics, pharmacies, laboratories, government agencies, etc.)
7. The technology to solve the problem of information access is readily available and cost effective.

The good news in healthcare is that only 25% of hospitals and 5% of clinics in the US have an investment in clinical information systems (CSI). This means that there are many green fields where standard based systems could be employed if one existed. I would submit there is not a CIS vendor in the market today that has industry standards based technology. They each have their own standards. Their technology implementation is their competitive advantage. Rather than interface with other vendors or a hospital's own products the vendor prefers the healthcare provider replace their own systems or another vendor's system with their product. This is good for the vendor but not very good for the healthcare provider or the escalating cost of healthcare. In addition, no single vendor today has an integrated CIS that meets all the needs of the customer.

I would suggest that the approach that is being taken by the Health and Human Services in creating the National Health Information Infrastructure and Local Health Information Infrastructure is correct. That is using technology to connect various EHR systems and using standards where appropriate. Keeping in mind that the cost and change management barriers are very large and difficult to overcome when implementing standards.

Near Term Suggestions:

1. Focus on the most wired hospitals, clinics, pharmacies, laboratories, and government agencies and create a shared information environment between a limited numbers of these organizations within a community and demonstrate the viability of the Local Health Information Infrastructure. This approach limits the risk and increases the chances of success.
2. Do not mandate STANDARDS. Use STANDARDS only where they are cost effective and where people will buy in to them.
3. Do not try and force CIS vendors to adopt standards. They have no financial incentive to change their product. In addition, if there is one common standard they lose their competitive position in the market.
4. Do not try and force healthcare providers that develop their own CIS to adopt standards. Just like the vendors they have no financial incentive to change.
5. Use an Internet GLUEWARE approach, to facilitate the connectivity between various organizations in the Local Health Information Infrastructure (LHII) and the National Health Information Infrastructure (NHII). If the LHII works the NHII will work by definition.
6. For the 75% of hospitals and 95% of clinics that do not have EHR today, HHS can provide financial incentives for them to implement CIS through Medicare and Medicaid.
7. Make sure the caregivers are on board before starting any CIS initiative. Many CIS installations still fail because the caregivers were not intimately involved in the decision process of which CIS vendor should be used. Physicians have a great deal of influence in the hospitals concerning the technology used or in many cases not used. Highly educated experts do not take kindly to mandates.
8. Do not repeat the mistakes of the petroleum industry. One size may fit all, but it is difficult at best to get a person to wear the garment if they don't pick it out themselves.
9. Most physicians have told me they spend limited time with their patients in the hospital, therefore it is imperative that the patient's EHR is accessible from the clinician's office, home and on the road.

10. Since many of us spend a large amount of time away from home and move frequently it is critical that our EHR is available to our caregivers and ourselves throughout the US. Internet technology provides this capability.

The real challenge in meeting the goal of an EHR for all of us is not so much a technology challenge but a culture change in the way highly trained people work. If the correct information is available in context for the caregivers when and where they need it to make decisions the EHR will be a success. I went through information cultural revolution in the petroleum industry.

I sincerely appreciate the opportunity to provide any insight, I can, in to the challenge of providing an accessible life long electronic health record for the citizens of our great nation. I am very encouraged to see that our leaders and congress are taking action to improve our Nation's healthcare system in a substantive way. If I can be of any further assistance, please do not hesitate to contact me.

Thank you for your time and consideration.

Sincerely,

Glenn R. Breed
Chief Executive Officer and President

Statement of MedMined, Birmingham, Alabama

SUCCESSFUL USE OF INFORMATION TECHNOLOGY TO IMPROVE HEALTHCARE OUTCOMES

"Bloodstream infections were reduced 31%, for a measured P/L impact of 1.8M." Bill Wing, CFO, Florida Hospital

"In only six months, non-reimbursed costs from hospital infection were down $618,000." Lance Peterson, MD, Evanston Northwestern

"After only one year, infections were down 19% hospital-wide, saving $1.05M." Gerry Fornoff, CEO, Lakeland Medical Center

Hospital-acquired infections affect about 6% of all patients admitted to U.S. Hospitals. In addition to morbidity and mortality, these infections are a major financial burden. When they occur among the fixed fee patient population (approximately 55% in the average U.S. hospital), most of the average $13,973 in direct treatment costs are not reimbursed. These non-reimbursed costs total millions of dollars each year and are a drag on operating margins. Thus, reducing the incidence of hospital-acquired infections both improves the quality of care and operating margins.

The key to reducing the number of infections is the proactive correction of process breakdowns that cause them. However, finding specific opportunities to improve care is a daunting challenge. Using current methods, Infection Control must wade through oceans of data to identify a few pieces of critical information. This data comes to Infection Control mostly in the form of printed reports regarding individual patients and results. The vast majority of time is currently spent digesting, organizing and analyzing this data (and not on the teaching and interventions that actually prevent infections). Many warning signs that reveal important issues remain concealed by the volume and complexity of data that must be monitored. And, tracking outcomes and measuring financial impact hospital-wide is nearly impossible.

MedMined combines patented technology, clinical support, evidence-based action plans, outcomes measurement, and cost/benefit analysis into a comprehensive, hospital-wide initiative to reduce hospital-acquired infections. This model has proven effective in measurably reducing the incidence of hospital-acquired infections and their associated costs in many types and sizes of hospitals. This success has been highlighted in publications as diverse as Fortune, MIT Technology Review, and the New England Journal of Medicine and in over twenty efficacy studies.

Human and Financial Impact of Hospital-Acquired Infections

Each year in the United States hospital-acquired infections affect 2 million patients and account for 50% of all major hospital complications.[1] Behind heart disease, cancer, and strokes, hospital-acquired infections are responsible for approxi-

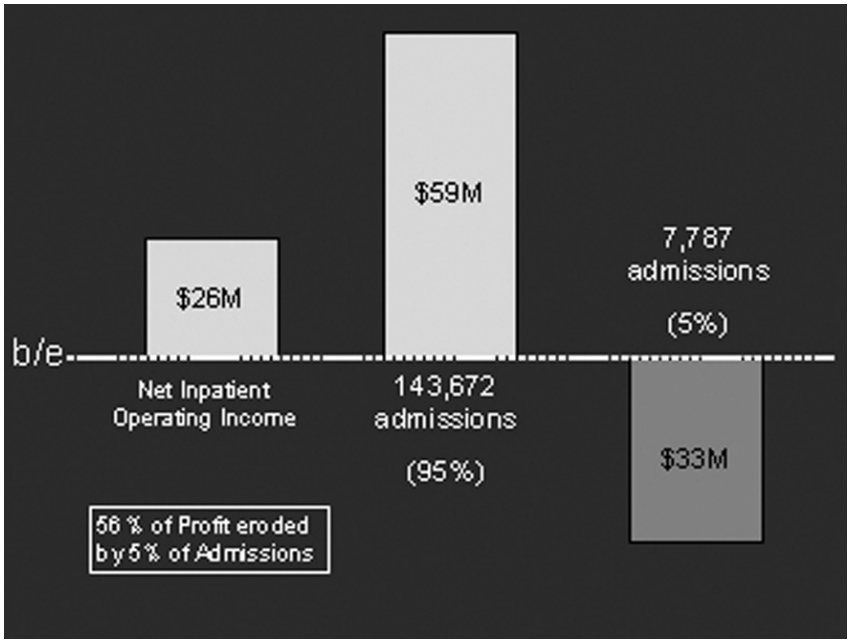
[1] Centers for Disease Control and Prevention. Public health focus surveillance: prevention and control of nosocomial infections. Morbidity and Mortality Weekly Report 1992; 41:783–7.

mately 88,000 deaths annually, making them the fourth leading cause of death in the United States.[2]

In addition to morbidity, mortality, legal risk, impact on malpractice rates, etc., hospital-acquired infections take a substantial, direct economic toll on hospitals. A May 2002 audit of over 50 studies about the cost of hospital-acquired infections computed the average, direct cost per infection to be **$13,973**.[3]

When these infections occur among the fixed fee patient population, very little of these costs are reimbursed. A study published in the Journal of the American Medical Association directly addressed this issue.[4] Under a DRG-based payment system, reimbursement for the cost of treating a hospital-acquired infection must overcome several major obstacles. The study found that among this patient population, 95% of the treatment costs were not reimbursed (avoidance of which would be a direct financial gain to the hospital).

The effect of these non-reimbursed costs is quite substantial. In a study of 151,459 admissions among a seven hospital system in the Southeast, we found that the 95% of admissions that had not acquired an infection provided a $59M inpatient operating profit. However, the 5% of admissions that had acquired a hospital infection accounted for $33M in net operating loss (risk adjusted). Thus, 5% of admissions eroded 55% of operating profits. (See the Figure at right).



In one Midwest hospital, a 2001 financial analysis revealed the following differences between patients with and without a hospital-acquired infection (HAI):

	Without HAI	With HAI
Ave. Length of Stay	5 days	24 days

[2] Hacek DM, Suriano TS, Noskin GA, et al. Medical and economic benefit of a comprehensive infection control program that includes routine determination of microbial clonality. Am J Clin Path 1999; 111:647–654. Jarvis WR. Selected aspects of the socioeconomic impact of nosocomial infections: morbidity, mortality, cost and prevention. Infect Control and Hosp Epidemiol 1996;17:552–557.

[3] Stone PW, Larson E, Kawar LN. A systematic audit of economic evidence linking nosocomial infections and infection control interventions 1990–2000. Am J Infect Control 2002; 145–52.

[4] Haley RW, et al. The financial incentive for hospitals to prevent nosocomial infections under the prospective pay system. An empirical determination from a nationally representative sample. *JAMA*. 1987; 257(12):1611–4.

	Without HAI	With HAI
Ave. Total Cost Per Patient	$5,026	$28,864
Ave. Direct Cost Per Patient	$3,119	$21,006

An examination of net operating margin (Net Revenue-Variable Cost) by payor, comparing patients with a hospital infection with patients without a hospital infection in the same DRG, revealed that every one of the 519 patients with a hospital infection was unprofitable for the hospital.

	Medicare	Medicaid	Commercial	ManagedCare	Blue Cross HMO/PPO	Self-Pay
Total Loss	($3,766,757)	($914,166)	($435,978)	($342,978)	($102,255)	($42,960)
# Patients with HAI	379	81	27	12	12	9
Ave. Loss per Patient	($10,793)	($11,286)	($16,148)	($28,582)	($8,521)	($4,773)

Infection Control Surveillance

Many hospital-acquired infections are preventable, because they stem from correctable process breakdowns (staff using poor sterile technique, improperly cleaned equipment, etc.) that recur. Although the solutions are straightforward and inexpensive (one study found the average cost of correcting such breakdowns was less than $1,200[3]) the real challenge has always been identifying where and when these systematic patient care breakdowns are occurring early enough to avoid unnecessary morbidity, mortality, length of stay and cost.

Better surveillance is the key to reducing hospital-acquired infections, antimicrobial resistance, and their associated costs. This has been proven in many studies, including the landmark SENIC Project of the 1970's.[5] At Northwestern Memorial Hospital in Chicago (683 beds), investigators showed that modest improvements in Infection Control surveillance with increased pattern detection led to a 23% reduction in the number of patients with a hospital-acquired infection and an estimated cost savings of $4.3 million over two years.[6]

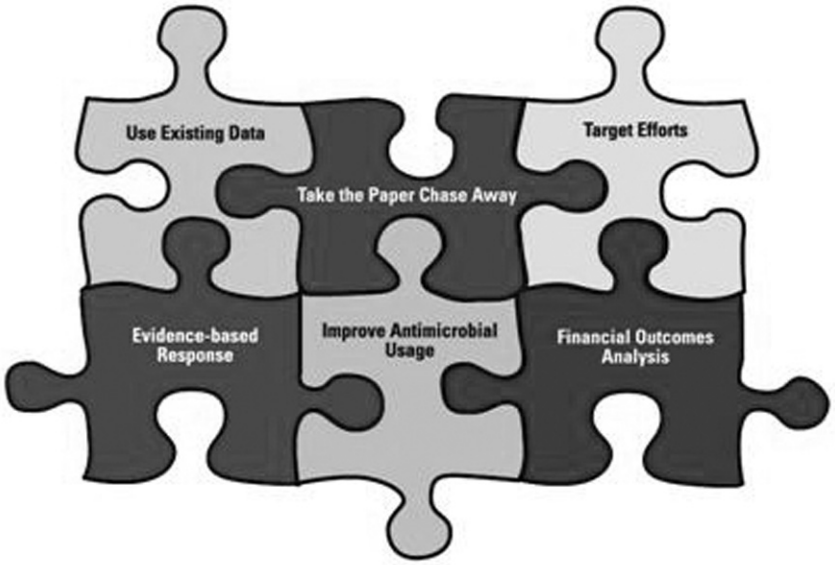
Traditionally, surveillance for outbreaks of hospital-acquired infections includes a manual review of microbiology data and suspected cases of hospital-acquired infection followed by the tabulation of basic summary statistics. Such summaries are arduous, time consuming, lack timeliness, and often mask emerging, complex patterns. Consequently, it has been widely recognized that sophisticated, active, and timely intra-hospital surveillance is needed.

Integrated Solution

MedMined's unique and patented technologies target quality improvement resources in ways not currently possible. But, technology alone does not improve process. MedMined has created a comprehensive model to elevate infection prevention to an effective, hospital-wide initiative. These components work together to produce measurable cost savings. The model includes: 1) capture, cleaning and mapping of existing data sources, so that they are amenable to electronic epidemiological analysis, 2) patented technologies, such as data warehousing and data mining/artificial intelligence, that automatically detect warning signs of patient care breakdowns and direct staff to problem areas, 3) clinical support by MedMined's expert clinical staff to help address known issues, 4) evidenced-based action plans and educational materials that generate real process improvement, 4) outcomes measurement to track progress at all levels, and 5) financial reporting to allow management at the executive level and support investments in infection prevention.

[5] Haley RW, Culver DH, White J, et al. The efficacy of infection surveillance and control programs in preventing nosocomial infection in U.S. hospitals. Am J Epidemiol 1985; 121:182–205.

[6] Hacek DM, et al. Medical and economic benefits of a comprehensive infection control program that includes routine determination microbial clonality. *Amer J Clin Path*. 111:647–54, 1999.



"Where Can We Improve?"—Data Mining Surveillance®

Specific and correctable quality breakdowns that cause hospital complications are evidenced by subtle patterns of related infections, colonization, contamination, and antibiotic resistance. However, because there are billions of potential patterns within electronic patient and laboratory data, these patterns often remain hidden.

MedMined's Data Mining Surveillance Service (DMSS) rapidly identifies patterns that indicate a specific and correctable quality breakdown. Because DMSS is able to "learn" from the millions of records within your hospital's varied databases, it can identify these breakdowns without search criteria, data entry, or lengthy paper chart review. The Data Mining Surveillance Service empowers your hospital to proactively address quality breakdowns that cause hospital-acquired infections.

Fusion of Technology and Clinical Expertise

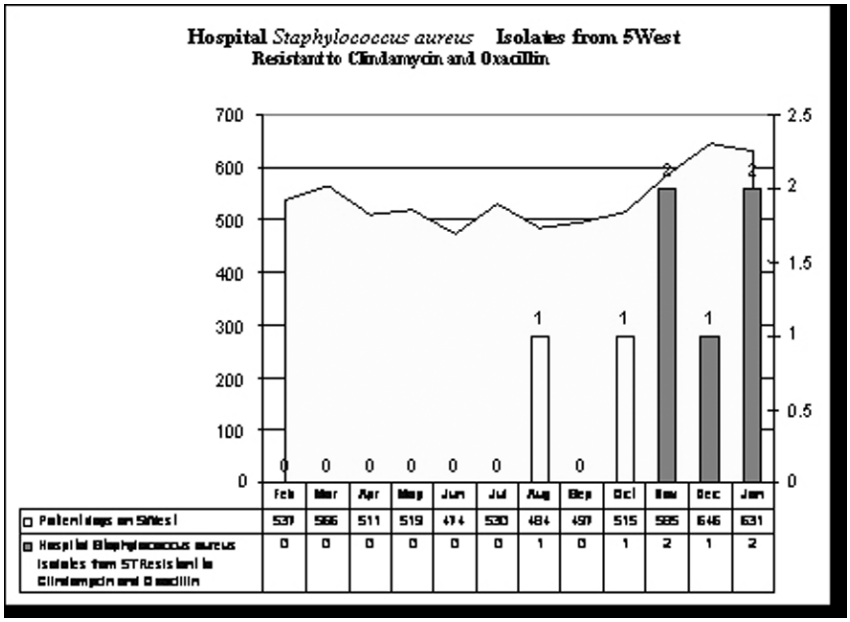
DMSS is not software. It is a service whereby clinical staff get the important actionable information they need to improve process without having to learn and maintain very complex technology.

Data mining is a form of artificial intelligence which allows scientists to discover important, useful patterns within large amounts of data without predefined search criteria. Using specially-designed, patented data mining techniques, MedMined monitors billions of potential patterns across inpatient and outpatient communities, and identifies relevant, actionable information. Results from the technology are reviewed by MedMined clinical staff and reduced to a concise report (including expert interpretation and suggested course of action) of important and clinically actionable items.

Each report from MedMined's Data Mining Surveillance Analysis represents a concise overview of important patterns indicating issues which should be investigated and addressed by hospital Infection Control and Quality staff. The reports delivered by MedMined typically contain 3–5 "alerts" each month. Each pattern describes a cluster of patients or isolates which represent a statistically significant departure from the baseline at your facility, and indicate a potentially important Infection Control issue.

Sample Alert:

Hospital *Staphylococcus aureus* Isolates from 5West Resistant to Clindamycin, Oxacillin



Issue: There is a 520% increase in the incidence of Hospital *Staphylococcus aureus* Isolates from 5West resistant to Clindamycin and Oxacillin. Given the baseline history and the unusual resistance to Clindamycin, we suspect this represents a breakdown in barrier precautions on 5West. This organism has a very long survival time—weeks to months in the environment—environmental survival is believed to play a part in transmission.

Recommended Actions:

- Person to person spread via direct contact, especially between a patient and the transiently colonized hands of a health care worker, is thought to be the principal mode of transmission. Assure that the staff has a waterless hand cleanser close at the bedside for use between patient contacts.
- The staff in the 5West area should be directly involved in the plans for control of this organism in their patients. Include all services who provide care or consultation, such as PT/OT, nutrition, respiratory therapy, physicians, nursing, environmental services, radiology and all others.
- Recent findings also suggest that virtually all patients colonized or infected with MRSA have acquired their strain from an external source, thus control must focus on prevention of transmission as well as antimicrobial use. This finding has applied to patients with both community and "Hospital" isolates.
- Current recommendations for control include surveillance cultures for patients, stringent barrier precautions and cohort nursing.
- Environmental contamination occurs rapidly for both continent and incontinent patients, therefore gowns plus gloves are recommended for contact with the patient or the patient's environment.
- All equipment that comes into direct contact with the patient becomes capable of transmitting this organism; therefore each patient must have their own stethoscope at the bedside, their own blood-pressure cuff, and all other equipment. Any equipment that cannot be individualized must be thoroughly wiped down with a hospital-grade disinfectant before removing it from the patient room or area.

"We Need More Time to Act"—Virtual Surveillance Interface

Forty percent (40%) or more of Infection Control Professionals' time is spent reviewing laboratory and patient data. Time spent reviewing data is time taken away from infection prevention activities. That is why MedMined streamlines this process with the Virtual Surveillance Interface (VSI), which allows customizable event monitoring and reporting of patients across the entire health system.

As a secure online service, the VSI is accessible from any Internet-enabled PC, and can travel with the busy ICP as rounds are made throughout a healthcare facility or across multiple sites. Event monitoring can be customized to the specific goals of each surveillance program, and can include reportable diseases, sentinel results, and bioterrorism agents.

Reporting capabilities of the VSI allow rapid, targeted review of important information, with the option of exporting results to Microsoft Excel for further analysis or formatting. Drill-down capabilities allow patient movement data to be rapidly correlated with laboratory results.

Studies have demonstrated that this service alone can save Infection Control Professionals 8–14 hours of manual data review each week.[7] This effort saved, allows Infection Control to focus more attention on educational initiatives and effective interventions.

Financial Outcomes Measurement

The bedrock of current Infection Control practice is the National Nosocomial Infection Surveillance (NNIS) program, orchestrated by the Centers for Disease Control and Prevention (CDC). NNIS is a benchmarking program, allowing hospitals to measure their infection rates among certain types of infection in certain hospital locations against their peers.[8]

Because it was designed in 1970 to account for the difficulty of manual surveillance, the NNIS system has limitations. For example, the focus on only certain infections in certain locations may leave many opportunities to reduce nosocomial infections undiscovered. Julie Gerberding, Director of the CDC, wrote, "Data from the NNIS System have generally been used to motivate institutions with higher-then-

[7] MA Gould, PA Hymel, SE Brossette. Paperless Infection Control: Time Savings and Process Improvements. Presented at SHEA 2002.

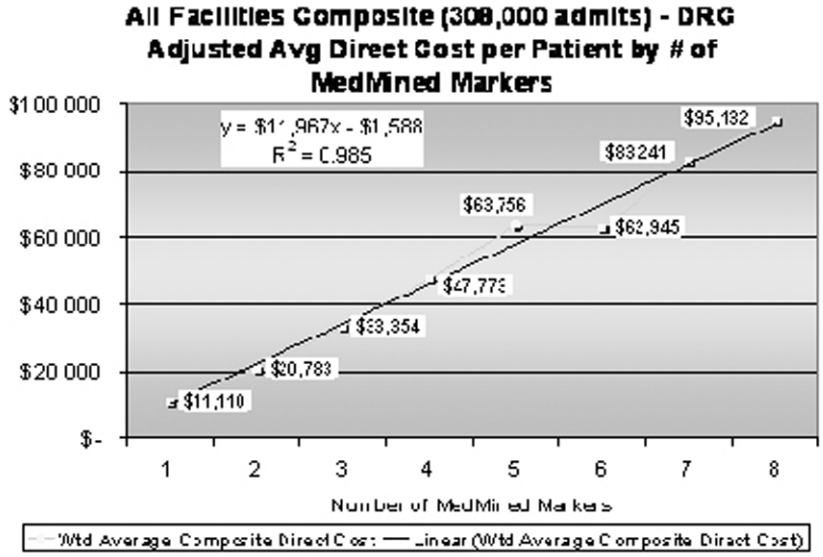
[8] National Nosocomial Infections Surveillance (NNIS) System Report, data summary from January 1992 through June 2003, issued August 2003. Am J Infect Control 2003;31:481–98.

expected infection rates to strive for the relevant national benchmark rate. The result may be both an underestimation of the preventable infections and missed opportunities to discover new prevention strategies."[9] Moreover, data on the inaccuracy and subjectivity of NNIS reporting has been published.[10]

Perhaps the biggest limitation on Infection Control departments caused by NNIS' epidemiological focus is the lack of translation to financial outcomes. As in most businesses, the allocation of scarce resources among departments requires that each department demonstrate its financial impact on the business. Those departments which cannot measure their impact to the bottom line are at a significant disadvantage in each budget cycle. Many Infection Control departments suffer this fate, because the statement that "ABCHospital has 2.6 central-line associated bloodstream infections per 1,000 central line days in the SICU, which is 25% percentile" does not say anything about how much nosocomial infections are impacting the bottom line of ABCHospital.

MedMined tracks the incidence of nosocomial infections (hospital-wide) and their financial implications through the use of the patent-pending Nosocomial Infection Marker™ (NIM). The NIM is a method for identifying distinct nosocomial infections through the analysis of existing electronic patient movement and microbiology data. Because it is automated, it is objective, efficient and comprehensive.

The MedMined Marker has been validated by several studies. In the first, clinical chart review of consecutive admissions revealed that the NIM had a sensitivity of >80% and a specificity of 99% (compared to traditional manual/NNIS surveillance sensitivity of 0.4% and specificity of 95%) in the identification of nosocomial infections.



In a second study of 308,000 admissions across 18 hospitals, each NIM (patients may have more than one, just as they may have several separate nosocomial infections) correlated to 6.35 extra days LOS and $11,967 in extra variable cost (risk-adjusted).

This study found that the 5% of patients that had at least one NIM eroded 56% of the total inpatient operating profits. The 95% of patients that did not acquire a hospital infection accounted for $59M in profit, whereas the 5% of patients that did acquire a hospital infection accounted for $33M in operating losses.

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[9] Gerberding JL. Hospital-Onset Infections: A Patient Safety Issue. Ann Intern Med 15 October 2002/Volume 137 Issue 8/Pages 665–670.

[10] Emori, TG, Edwards JR, Culver DH, et al. Accuracy of reporting nosocomial infections in intensive-care-unit patients to the National Nosocomial Infections Surveillance System: A pilot study. Infect Control and Hosp Epidemiol 1998;19:308–16.

A third study of 66,780 admissions across 14 hospitals concluded that each MedMined Marker added 7.2 days to LOS and $15,300 in variable cost (risk-adjusted).

Thus, the Marker is a not only a clinically valid measurement tool, but also useful for measuring the financial implication of these infections.

Published Case Studies

At a 600-bed university-affiliated, tertiary-care hospital, MedMined's Data Mining Surveillance increased pattern/cluster detection of related infections 10-fold, when compared to traditional NNIS surveillance, while maintaining 90+% specificity. Among patterns discovered by both traditional methods and the data mining analysis, a bloodstream outbreak of VRE was identified 4 weeks earlier by the data mining analysis.[11]

Seven months of DMSS at LakelandHospital (156 beds) led to significant changes in policies and procedures, as well as direct intervention by Infection Control staff. Previously unidentified patterns detected include: (1) A pattern of multidrug-resistant *Klebsiella* among ventilated patients in the ICU (2) An increase in blood culture contaminants from the ED (3) An unusual cluster of resistant *E.coli* on a specific ward (4) A cluster of VRE from urinary isolates (5) A cluster of *Alcaligenes* on a specific ward.[12] After 12 months of prospective DMSS reporting, LakelandHospital documented a 22% overall reduction in hospital-wide infection rates.

MedMined's Virtual Surveillance Interface reduced time spent by Infection Control reviewing paper charts by 8–14 hours per week at Children's Hospital of Alabama (250 beds), while also rapidly identifying unsuspected outbreaks of nosocomial *Acinetobacter* and community-acquired *Yersinia*.[13]

Retrospective DMSS analysis at a 100-bed VA facility revealed the source of a multi-drug resistant *Pseudomonas* outbreak 6 weeks before it was detected by traditional surveillance methods. Prospective analysis revealed several patterns of multidrug resistant *Acinetobacter* and *Klebsiella* which were proactively managed.[14]

DMSS detected a previously unknown outbreak of central line-associated bloodstream infections at a 250-bed pediatric hospital. This discovery led to focused investigation and interventions. In the months following implementation of these targeted interventions, patient-day adjusted analysis revealed that the incidence of hospital-acquired CVL-associated bloodstream infections decreased by 43% (p=0.03).[15]

At Hilo Medical Center (278 beds) Data Mining Surveillance alerted Infection Control to a previously unrecognized, dramatic (410%) increase of hospital *Pseudomonas aeruginosa* isolates. Chart reviews revealed that 15 of the 18 isolates were hospital-acquired infections, resulting in a yield of 83% predictive value. Focused investigation led to intervention efforts on the unit with the majority of cases. In the third quarter, only 1 subsequent respiratory isolate of hospital *P. aeruginosa* occurred. From Oct 1 through Nov 30, 2002, only 2 respiratory isolates of hospital *P. aeruginosa* were noted. Had the cases continued unchecked for the following three months, HiloMedicalCenter would have spent approximately $628,785 in treatment costs for infected patients.[16]

At FloridaHospital (1,752 beds), Data Mining Surveillance revealed a 190% (p value 0.004) increase from baseline of *A. fumigatus* respiratory isolates. Since HVAC systems are often suspect in cases of hospital-acquired aspergillus the air handlers were examined. Fungal cultures were obtained from the final filters of the suspect HVAC. Cultures grew out *A. fumigatus*. Physical inspection of the filters revealed

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[11] Hymel PA, Brossette SE, Moser SA. Data Mining-Enhanced Infection Control Surveillance: Sensitivity and Specificity. Presented at SHEA 2001.

[12] Vance, P, Meyers, D, Hymel, PA. Prospective Identification of Quality Issues Related to Nosocomial Infections through Data Mining Surveillance in a Community Hospital. Presented at SHEA 2002.

[13] MA Gould, RN, CIC and SE Brossette, MD, PhD. An outbreak of *Acinetobacter baumannii* in ventilated patients of a pediatric hospital identified by data mining surveillance. Presented at SHEA 2002. MA Gould, PA Hymel, SE Brossette. Paperless Infection Control: Time Savings and Process Improvements. Presented at SHEA 2002.

[14] SE Brossette, BD Taylor, B Warren, KC Avent, SA Moser. Improving Infection Control Surveillance Using Data Mining Technology. Presented at ICAAC 2001. September 22–25, 2001. Chicago.

[15] DC Branca, MA Gould. A reduction of bloodstream infections in an oncology unit following data mining surveillance and targeted interventions. Submitted for poster presentation, SHEA 2003.

[16] JH Halloran. Rapid Mitigation of *Pseudomonas aeruginosa* outbreakidentified by novel surveillance technology at Hilo Medical Center, Hilo, Hawaii in June 2002. Submitted for poster presentation, SHEA 2003.

that they had not been seated properly, allowing some passage of unfiltered air. The filters were replaced and seated properly. The incidence of hospital-acquired aspergillus decreased 80% (p value=0.034).[17]

At Providence St. Vincent Hospital (450 beds) in Portland, Oregon, Data Mining Surveillance detected an unsuspected, significant increase in hospital-associated *Serratia marsescens* isolates from respiratory sources. Upon IC investigation, it was discovered that respiratory care staff on the units involved were utilizing tap water in the humidifiers on the ventilators. A pre-packaged humidifier with sterile water system was implemented (that was cheaper than the old system). Compared with the three month period in which the alert was generated, the process change generated a 58% reduction.[18]

Data Mining Surveillance identified a previously unknown pattern of community-acquired urinary isolates from patients collected while in outpatient radiology. This cluster represented a 4-fold increase from the previous 9 month baseline (p= 0.026). All patients had a urethrogram procedure. Infection Control discussed pattern with unit director, staff educator and charge nurse. Supervisors reviewed policies and performed competency checks on staff. ICP visited staff at random to establish if technique was consistent with policy. In the 20 weeks following full implementation there was a 33% reduction in positive urine cultures from this unit versus the 20 weeks prior to improvement efforts. (p = 0.039).[19]

The combination of Data Mining Surveillance, the ability to provide regular feedback on progress, and a team-based approach to infection prevention led to an 87% reduction in the incidence of nosocomial MRSA in an ICU and a concurrent decrease in VRE hospital-wide. The cost avoidance was estimated to be $3,183,030. A decrease in average length of stay of 2 days was also noted on this ICU unit over the post-intervention period.[20]

MedMined alerted Children's Hospital of Alabama to four patients in June 2003 with initial blood isolates obtained late in the hospital stay among patients on the Oncology Unit, representing a 16-fold increase from the previous 4 month baseline (p=.009). Culturing practices were unchanged, during, and after pattern identification. Interventions directed at bloodstream infection prevention were implemented. In the 12 weeks following full implementation only one hospital-associated isolate was obtained, a reduction of 90% (p = 0.014).[21]

At St.FrancisHospital in Memphis, MedMined's service enabled an aggressive team approach to reducing the incidence of bloodstream infections and contaminated specimens. Weekly average of non-duplicate bloodstream isolates fell from.85 (17 pts / 20 weeks) to.30 (6 pts / 20 weeks), a 64% reduction. Focused surveillance for clinical infection yielded 14 weeks without a single hospital-acquired bloodstream infection in the post intervention period.[22]

MedMined's objective measurement of hospital-acquired infection rates received clinical validation at EvanstonNorthwesternHospital. Using its Nosocomial Infection Marker™, MedMined calculated the hospital-acquired infection rates across the hospital to be 4.56% of admissions. An independent chart review of consecutive admissions calculated the infection rate to be 4.67%. Over the same period, traditional targeted surveillance methods indicated the rate was 0.3% and required significantly more time and resources to compute. Thus, MedMined's method was more accurate and efficient method of computing infection rates.[23]

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[17] Kaptur KC. Identification of Nosocomial Aspergillis Fumigatus Using Virtual Surveillance. APIC 2004.

[18] Church NK. Cluster of *Serratia marsescens* associated with tap water utilization on ventilated patients: Identification, investigation and correction. APIC 2004.

[19] Vasson BA. Identification, investigation and correction of urethrogram-associated urinary tract infections in a pediatric facility. SHEA 2004.

[20] Breaux DB, Baker JD, et al. A Unit Based Council Develops a Team Approach to Reduce Methicillin-resistant *Staphylococcus aureus* Infections in the Intensive Care Unit. APIC 2004.

[21] Vasson BA, et al. A reduction of bloodstream infections in a pediatric oncology unit following electronic surveillance and targeted interventions. APIC 2004.

[22] Breaux DB, Baker JD, et al.Focused Bloodstream Infection Prevention Success Using a Team-based Unit Level Approach. APIC 2004.

[23] Gavin PJ, et al. Comparison of 'Whole House' Versus Routine Targeted Surveillance for Detection of Nosocomial Infection. SHEA 2004.

Statement of National Association of Chain Drug Stores, Alexandria, Virginia

Madame Chairwoman and Members of the Health Subcommittee. The National Association of Chain Drug Stores (NACDS) is pleased to submit this statement for the record regarding health care information technology. NACDS represents more than 200 chain pharmacy companies that operate nearly 32,000 community-based retail pharmacies. We are the primary provider of outpatient prescription drugs in the United States, dispensing about 70 percent of the 3.1 billion prescriptions that are provided each year. We believe that our industry has been in the forefront of using technology to increase efficiencies and improve patient care in the delivery of pharmacy services. Almost all pharmacy claims are adjudicated and paid through an online real time standards-based communications system.

We recognize and appreciate the leading role that you and this Subcommittee have played in moving forward the health care information technology agenda. In particular, we want to thank you for your efforts in including specific language in the Medicare Modernization Act (MMA) of 2003 that requires the development of standards for an E–Rx (E–Rx) program for Medicare prescriptions. We also know of your interest in exploring the issues and benefits that can be derived from the use of electronic health records. We believe that both initiatives will enhance quality of health care for patients, as well as create unparalleled efficiencies in the health care delivery system.

"E–Rx" Principles

NACDS is working with the HHS National Committee on Vital and Health Statistics (NCVHS) as its members prepare to recommend standards to the Secretary for the E–Rx program mandated by MMA. Many of our pharmacies are already electronically connected to physicians, and are able to receive approvals from physicians for prescription refills. We look forward to the additional efficiencies that will result as the more expanded E–Rx program is implemented over the next several years.

To improve the overall prescribing process, and create momentum for the adoption of E–Rx, the National Community Pharmacists Association (NCPA) and NACDS created SureScripts in 2001. SureScripts is a neutral, secure E–Rx network that is compatible with all major physician and pharmacy software systems.

More than 60 percent of the nation's retail pharmacies have now tested and certified their pharmacy application on the SureScripts network. That number is expected to grow to more than 75 percent of the pharmacies in the U.S. by end of summer 2004. SureScripts uses the National Council for Prescription Drug Programs (NCPDP) SCRIPT Standard to serve as the foundation for the software used to transmit prescriptions. SCRIPT was developed through a consensus process among community pharmacy organizations, pharmacy software vendors, database providers, and other stakeholders. Currently, the standard addresses the electronic transmission of new prescriptions, prescription refill requests, prescription fill status notifications, and cancellation notifications.

The strength of NCPDP SCRIPT standard is that it is a national standard that addresses the vast majority of the core functionality required by the MMA. It currently facilitates the bidirectional transmission of prescription information between prescribers and dispensing pharmacies and pharmacists, and holds the potential to allow for the transmittal of information on eligibility and benefits and medication history. SCRIPT will likely be among the standards that are suggested by NCVHS to the Secretary to serve as basis for the broader E–Rx system.

As we move forward with building on these existing standards for an E–Rx system, and prepare for more widespread use of this technology, NACDS believes the following principles should be incorporated into any pilot or program for the electronic transmission of prescriptions:

Physician-pharmacist-patient choice and relationship should be protected: Prescriptions are communications between health care professionals—primarily physicians and pharmacists—regarding a specific course of pharmaceutical treatment. Most of these communications are currently paper based, but the goals of E–Rx are to replace this paper system with a secure, efficient, quality-enhancing, high-tech system.

E–Rx should be used as a tool to enhance the pharmacist-physician-patient relationship, not displace or change it. For example, patients must still be able to obtain needed prescriptions from the pharmacy of their choice. That is, this technology should not be used for the purposes of steering patients to "preferred" drugs that are not in the best interest of the patient, or steering patients to pharmacies that may not be the patient's choice.

Physicians must be assured of their ability to prescribe both "on formulary" and "off formulary" and consumers must be assured of their choice of pharmacy, and not be coerced into using mail order prescription drug sources.

Prescriptions should be not be altered once sent by to the pharmacy: Electronic prescriptions should be transmitted directly from physicians to pharmacies without interference from third party payers or PBMs who may manipulate or change the prescription for various self-interested economic reasons. Once a physician has transmitted an electronic prescription, no intervening entity should alter the prescription information or content, or change the pharmacy site that the patient has chosen. Physicians and pharmacists must be able to rely on the security of the transmitted prescription information. Any altering by an intermediary of prescribed drug, strength, quantity, allowed refills, or directions would certainly adversely affect patient safety, and would constitute the unauthorized practice of medicine and pharmacy in most instances. Changes to the prescription should only be made after a dialogue between the prescribing physician and the dispensing pharmacist.

Patient medication and medical history should be routed through the pharmacy: The goal of the E–Rx system should be to help the physician make the best choice of medication possible at the point of prescribing. The most complete information about the patient's medical and medication history will be provided to the physician if all information is routed through the pharmacy to the physician. That is because payers have only a subset of the full medical and medication history, and can only provide information on prescription that they have paid for.

This excludes anything that the patient paid for out-of-pocket, such as prescriptions not covered by the payer, and a vast array of nonprescription items including herbal and nutritional supplements. Payers also do not have information that patients provide specifically to the pharmacy during patient counseling, such as potential allergies, sensitivities, and other adverse reactions. Therefore, the most complete medication history would be provided to the physician if it was routed through the pharmacy.

Value of the pharmacist must be preserved: Pharmacists are medication experts that collaborate with physicians to enhance overall prescription drug use, and reduce the likelihood of medical errors and adverse drug reactions.

We believe it is only logical that E–Rx programs encourage such collaboration, and should not create standards or procedures that would disrupt such collaboration. Moreover, the E–Rx system should not push some of pharmacists' traditional duties upon already overworked physicians, such as drug utilization review (DUR) and checking for other medication-related concerns. Such proposals would act as a barrier to physician adoption of E–Rx.

E–Rx standards and tools must be free of non-clinical influence: MMA requires E–Rx standards to "allow for the messaging of information only if it relates to the appropriate prescribing of drugs, including quality assurance measures and systems." An efficient E–Rx process would not burden physicians with extraneous electronic promotional messages. To protect the prescriber-patient relationship, a physician should not be influenced by advertising, such as "pop-up messages" at the point of E–Rx. MMA standards should enhance the physician's clinical decision-making process.

The program should also allow physicians to "have ready access to neutral and unbiased information on the full range of covered outpatient drugs." Physicians should be able to view with equal ease all necessary information, including information about drugs that are preferred on-formulary, non-preferred on-formulary, and off-formulary, without having to click through multiple screens or other burdensome steps. All information provided to physicians should be fact-based and transparent, and should identify the source of the information. Any incentive payments given to technology vendors to display information in a particular way should be fully disclosed to the physician and pharmacist and any advertisements, such as banner ads, should be clearly labeled as a paid advertisement.

In addition, the system should show the physician and the patient all the choices of pharmacy providers that they have—both in network and out of network. There should be no steering of beneficiaries to mail order pharmacies. While the selection of a particular pharmacy would not change the cost sharing required, it would allow the patient the full range of options when selecting their pharmacy provider.

EHR should be compatible with E–Prescribing: The primary goal of an electronic health information system is to allow the sharing of information between E–Rx and Electronic Health Records (EHRs). However, the MMA requires more information to be shared than the e—prescribing SCRIPT messaging format standard can share today. Therefore decisions must be made to determine the most appropriate standards to carry the additional MMA required information. A number of

possibilities exist. Some of the MMA required information could be added to the SCRIPT standard. However, only that information that is to be shared between prescribers and pharmacists should be added to the SCRIPT standard, which has historically been limited to that use.

In addition, some of the additional MMA required information could be included in the new EHR standards, which are currently being created by the standards development organization known as Health Level 7 (HL7). The good news is that work is already underway to make sure that information included in the EHR standards can be transmitted to those using the e-prescribing SCRIPT standard and vise versa. NACDS is involved in this effort.

Financial incentives for E–Rx should be provided to pharmacies: MMA provides for grants to physicians to encourage physician adoption of E–Rx. The grant money is intended to assist physicians in computer system upgrades and staff training that will enable them to engage in E–Rx. There are significant costs associated with the successful implementation of E–Rx for both physicians and pharmacists; incentives should be made available to pharmacists as well.

Conclusion

NACDS believes that enactment of the E–Rx provisions of MMA will encourage the further development and enhancement of E–Rx. We look forward to active engagement in the development of policies, standards and infrastructure to make widespread E–Rx a reality, along with electronic interactivity among physicians and other health care practitioners for the sharing of patient medical and medication histories.

Statement of Thomas W. Hughes, National Electronic Attachment, Inc., Atlanta, Georgia

My name is Thomas W. Hughes and I am the President and CEO of National Electronic Attachment, Inc. Our company is in the electronic attachment business (attachments being defined as anything sent to an insurance payor in support of an electronic claim. In dental, this could be an x-ray, perio-chart, and/or narrative or in medical this could be a certificate of medical necessity, doctor's notes, ambulance notes, lab reports, etc.)

Today attachments in the non-MEDICARE world, transmitted between a provider and a clearinghouse can move over a secure internet. In fact, attachments for Medicare patients transmitted from a general provider to a specialist also can move over a secure internet. However, an attachment or claim may not be transmitted over a secure internet between the clearinghouse and the medical payor.

In many cases, the Medicare payor receives non-medical claims and attachments over the secure internet. However, the moment the patient becomes Medicare eligible, the claim MUST be sent electronically (previously it MIGHT be sent electronically) and the attachment must be sent via mail (previously it MIGHT have been sent electronically even to the same payor).

We as a company as well as well as the Association for Electronic Health Care Transactions (AFEHCT), are working through this organization toward standardizing both transactions and attachments. My best guess is that a mandated electronic attachment rule will be ready by 2008, even if the NPRM comes out in the Fall of 2004. At this time next year, our own company should have about 600 hospitals and 30,000 providers processing electronic attachments, all over the internet.

The latest research for attachments on the institutional side shows a cost of processing each attachment as $20–$24 per attachment to the institution. Cost on the payor side is $6–$10 per attachment. On the physician/professional side cost is approximately $4–$8 each to the physician, and in dental $1–$2 each to prepare.

The cost of administrative work in this area is alarming, especially when the cost would fall to less than 25% of the current rate if the internet could be used to transmit Medicare attachments from provider to payor. As we move to the electronic health records, it is imperative that we as a country open up the secure internet to all possibilities of getting these records into the hands of healthcare professionals as well as to the patients themselves.

Since covered entities fall under the HIPAA umbrella, we have proper safeguards built in our system for both privacy and security. I am concerned that we have tools today available to cut healthcare costs, and are not using them. The marketplace is waiting for this to open up and I predict if the government does open up the secure internet, the electronic health record will be a lot closer than ten years out. In my conversations with various vendors, I find that the lack of being able to use

the internet in MEDICARE is a major stumbling block to progress in healthcare. Since the federal government pays out more than half the healthcare dollars, they have been the only ones to deny free use of the secure internet.

Statement of Charles Homer, National Initiative for Children's Healthcare Quality, Boston, Massachusetts

Introduction

The National Initiative for Children's Health Care Quality (NICHQ) is pleased to submit this statement for the record as part of the Subcommittee's Hearing on Health Care Information Technology (IT). NICHQ, a premier independent national organization committed to leading the way to high quality care for all children, enthusiastically supports the President's goal of assuring that most Americans have electronic health records within the next ten years. We represent talented health professionals working every day to improve care for children and adolescents, experts in pediatrics and quality, and parents who share their stories and experiences to make sure that we achieve our goals. With healthcare IT now a central focus of public and private efforts to improve health care, Congress has a tremendous opportunity to assure that this attention also contributes to better quality and efficiency of care provided to children, particularly thosewhose care is either financed or provided by public programs. Nearly 25 million children have their care overseen or provided by programs within various Federal Agencies, including the Department of Health and Human Services, the Department of Defense, and the Federal Employee Health Benefits Program.[1] Realizing this benefit for children will require understanding and attention to the specific issues unique to IT applications in children's health care.

Background

A common saying among child health professionals is that "*children are not little adults.*" These differences have been well described and are often referred to as the four D's. Children are ***dependent*** on parents and their families for access to the health care they need. Thus, strategies must take into account how to collect and provide information to more than one patient. Childhood is characterized by a ***developmental*** trajectory that entails rapid change and emerging abilities to use health information. Children's health is characterized by a ***differential*** epidemiology of fewer major chronic illnesses, many acute illnesses, and a high need for preventive services. Finally, children have different *demographic patterns,* being the poorest and most diverse segment of our population. Current census projections estimate that by the year 2050, the majority of the U.S. population will be represented by racial and ethnic minority groups.[2] Projections for this transition in the pediatric population are even more rapid, and some regions in the US already have experienced a shift in pediatric demographics to "majority minority."[3] The poverty rate among children and their families also means that they rely disproportionately on public health insurance (through Medicaid and SCHIP) and public health systems for health care, making the coordination of services and information even more critical.[4, 5]

At the same time, children experience the same chasm in the quality and safety of care that the Institute of Medicine (IOM) documented for populations overall.[6, 7, 8]

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[1] Dougherty D, Simpson L. Measuring the Quality of Children's Healthcare: A Prerequisite to Action. *Pediatrics Supplement* (Editor and paper Author), *January 2004,* Vol. 113, No. 1: pp 185–196

[2] U.S. Bureau of the Census, decennial census and population projections. Available at: www.census.govprod/3/98pubs/p23–194.pdf. Last accessed July 1, 2004.

[3] State of California, Department of Finance. CountyPopulation Projections with Age, Sex, and Race/Ethnic Detail, July 1, 1990–2040. Available at: http://www.dof.ca.gov/html/Demograp/projca.pdf. Last accessed July 1, 2004.

[4] Forrest C, Simpson L, Clancy C. Child Health Services Research: Challenges and Opportunities. *Journal of the American Medical Association* June, 1997, 277(22):1787–1793

[5] Simpson L, Zodet MW, Chevarley FM, Owens P, Dougherty D, McCormick M. Health care for children and youth in the United States: 2002 report on trends in access, utilization, quality, and expenditures. Ambulatory Pediatrics. 2004; 4:131–153.

[6] Institute of Medicine, (1999). *To err is human: building a safer health system*. Edited by L.T. Kohn, J.M. Corrigan, and M.S. Donaldson. Washington, DC: NationalAcademy Press.

[7] Institute of Medicine. (2001). *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: NationalAcademy Press.

Continued

Children present unique challenges when studying quality and safety which often leads to their exclusion from research. Indeed, the landmark IOM report on patient safety noted above contained fewer than a half dozen citations that were specific to children. Examples of poor quality of care for children exist for all types of care (e.g. preventive, acute, chronic and end of life care), in all settings (e.g. ambulatory care, hospital care), and all types of systems (public, private, managed care, fee for service). Millions of children fail to receive the care they need (e.g. immunizations), receive care that has the potential to harm them (e.g. medication errors), or care that they do not need and which provides no benefit (e.g. antibiotics for the common cold. And racial/ethnic minority children often suffer disproportionately from poor quality care.[9] When errors do occur their impact may be greater due to the different physiologic capability of children, particular infants, to buffer the incorrect dosage or other error.[10] We have the scientific knowledge, dedicated health professionals, and tools available to do much better today!

The Role of Healthcare Information Technology

Accelerating the use of information technology is an essential step toward improving the quality and safety of children's health care. Fortunately, momentum is building thanks to the efforts of the Department of Health and Human Services with Secretary Tommy Thompson's leadership and commitment. For example, the Agency for Healthcare Research and Quality is supporting numerous research and other projects to develop the information needed to understand the most effective ways of integrating IT into healthcare as well as assisting hospitals to plan and implement major IT deployments. Recently, a comprehensive agenda was laid out at an important national meeting which was held in Atlanta, Georgia last December and hosted by the Public Health Informatics Institute.[11] A follow-up meeting sponsored by the American Academy of Pediatrics and the Maternal and Child Health Bureau is planned for September. Also, thanks to the leadership of key pediatric organizations,[12] a pediatric Special Interest Group has been formed within HL7 to address clinical standards. And pediatricians will participate in the second meeting of the National Health Information Infrastructure in July.

However, because of numerous differences between adult and pediatric services themselves as well as specific issues with pediatric IT applications, one cannot assume that a high degree of IT investments will naturally translate into similar levels of benefit for adult and pediatric patients. The AmericanAcademy of Pediatrics has identified special requirements to be included in electronic medical record systems for use in pediatrics.[13] For example, many of the medications errors we see today that harm children are due to dosing errors because most medications are prescribed based on a child's weight and require calculation. Incorporating weight-based dosing features to electronic health records will save children's lives. Children and families rely on our health care system for health promotion and disease prevention and monitoring growth is a key part of this important service. Electronic health records need to facilitate the charting of a child's height, weight, head circumference and body mass index using standardized growth charts to identify problems early. This has never been more important than now as we face an epidemic of childhood overweight and obesity. Many children rely on multiple systems for their health care needs, including schools and the foster care system, and electronic health records should facilitate the coordination of care across these settings. Finally, many of the strategies being used today to foster more rapid adoption of evidence-based health care may be particularly difficult for child health providers to implement.[14] Because pediatricians and family practitioners have the lowest in-

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[8] Leatherman, S & McCarthy, D. (2004) Quality of Healthcare For Children and Adolescents: A Chartbook. *Commonwealth Fund*, New York, NY. Available at http://www.cmwf.org/programs/leatherman—pedchtbk—700.asp

[9] Horn IB, Beal AC. Child Health Disparities: Framing a Research Agenda. *Ambulatory Pediatrics, forthcoming Summer 2004.*

[10] Kaushal, R., Bates, D.W., Landrigan, C., et al. (2001) Medication errors and adverse drug events in pediatric inpatients. *JAMA Vol. 285*:2114–2120.

[11] Public Health Informatics Institute. Developing Child Health Information Systems to Meet Medical Care and Public Health Needs. Available at http://www.allkidscount.org/pdfs/12–03MeetingSummary.pdf

[12] American Academy of Pediatrics, American Board of Pediatrics, Child Health Corporation of America, National Association of Children's Hospitals and Related Institutions, National Initiative for Children's Healthcare Quality, Nemours Foundation.

[13] *AmericanAcademy of Pediatrics, "Special Requirements for Electronic Medical Record Systems in Pediatrics", Pediatrics* 108 (2): 513–515.

[14] Simpson L. Lost in Translation? Reflection on the Role of Research in Children's Health Care Improvement. Health Affairs, *Forthcoming April, 2004*

comes and may practice more often in undercapitalized settings,[15] resources for improvement, including information technology and participation in improvement collaboratives, are less available. For all of these reasons, we must make sure that children's unique needs are addressed as we move forward. The following steps would assist in that goal.

Recommendations

1. Support specific attention to child health care's unique characteristics as healthcare IT standardization moves forward.
2. Include a requirement that all government contracts for health care IT *which will be used in settings where children are cared for* specify how they will address the special information technology requirements for optimal care of children.
3. Ensure that federal healthcare IT initiatives, such as those detailed by Dr. David Brailer in his testimony, specifically include the many settings where children receive care, including children's hospitals, local health departments, and schools.
4. Facilitate monitoring of progress towards the reduction of health care disparities for children by supporting efforts to include race, ethnicity and primary language among standard demographic measures.
5. Make investments in quality improvement and clinical information systems (including registries) eligible for enhanced match under Medicaid.
6. Establish access to low cost loans and other capital strategies to support child health providers in the purchase of healthcare IT systems.
7. Increase the budget of the Agency for Healthcare Research and Quality to at least $443 million including adequate funding to support additional research and demonstrations of the impact of healthcare IT in child and adolescent health care with a particular emphasis on the interoperability of systems across public and private sectors and settings.

Madam Chairman and Members of the Subcommittee, the child health professionals of this country stand ready to assist Congress and the Administration in advancing the use of health information technology to improve the quality and safety of health care for all Americans, including our children.

Statement of Kenneth W. Kizer, National Quality Forum

On behalf of our more than 200 member organizations, the National Quality Forum (NQF) commends Chairwoman Johnson's leadership in calling for greater use of information technology to make healthcare better and safer.

Information Technology and Healthcare Quality

Few technological advances have held so much potential to improve healthcare, yet has so far realized so little actual impact on everyday patient care, as has electronic information management. This is especially ironic when one considers that healthcare is the most information-intense enterprise that human beings have ever engaged in and that many diagnostic and treatment technologies are models of electronic sophistication. Unfortunately, patient medical records and methods of moving patient-related information along the continuum of care have remained much the same as they were a hundred years ago.

The absence of a national electronic information management system to support coordinated, comprehensive, patient-centered healthcare contributes to the occurrence of medical errors; hinders efforts to measure and improve health system performance; and makes improvements in efficiency extremely difficult.

NQF's Role in Information Technology and Quality

The National Quality Forum (NQF) is a voluntary consensus standards setting body (similar to the American National Standards Institute or ANSI) that operates in accordance with the National Technology and Transfer Advancement Act of 1995, OMB Circular A–119 and other relevant federal guidance. The NQF is dedicated solely to healthcare, and healthcare quality improvement in particular. The NQF

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[15] *C.K. Kane and H. Loeblich, "Physician Income: The Decade In Review", in American Medical Association, Physician Socioeconomic Statistics, (American Medical Association, Chicago, Illinois, 2003)*

was established in 1999 subsequent to the recommendation of a Presidential Commission.

The NQF has a keen interest in healthcare IT because information technology is a critical enabler of improved quality and because the national performance measures, quality indicators and other standards endorsed by the NQF will be core data elements used in healthcare IT systems in the future for reporting of performance, pay-for-performance programs and other similar purposes.

In so far as improved medical informatics is a critical enabler of healthcare quality improvement, the NQF has promoted the development and widespread deployment of improved healthcare information technology since its creation. In this vein, in partnership with the Institute of Medicine of the National Academy of Sciences and with support from the Markle Foundation, the NQF held a National Summit on Information Technology and Healthcare Quality in March 2002. Building on the work of the National Committee on Health and Vital Statistics and others, this Summit appears to have accelerated the momentum for more collaborative efforts in this area and highlighted the need for a shared vision of a national health information infrastructure (NHII).

Implementation of a national health information infrastructure is one of the nation's most urgent needs. Participants in the National Summit on Information Technology and Healthcare Quality agreed that implementing a NHII is fundamental to achieving major improvements in the efficiency and quality of healthcare, and they generally agreed on the basic design principles for such a system.[1]

While the workgroups convened at this Summit occasionally differed regarding specific potential strategies recommended for achieving universal implementation of clinical information strategies, there was remarkable consensus about several fundamental issues; namely:

1. The federal government has a crucial leadership role in promoting a national health information infrastructure. However, to achieve rapid adoption, compatible incentives, and consistent public messages, it is essential that private organizations and government entities collaborate and take reinforcing actions.
2. The highest priority should be given to adopting uniform standards for message formats, nomenclature, data exchange, and other aspects necessary for interoperability among systems. Without underlying standards, healthcare IT investments will continue to be risky, limited in function, unnecessarily costly, and potentially rapidly obsolete. While the federal government can lead this effort through its many regulatory and purchasing activities, private healthcare entities must "buy into" the effort if they are to purchase products using these standards.
3. Opportunities to provide financial support and incentives for adopting and using healthcare IT abound. Although grants to support connectivity and IT purchases are important, other incentives could productively target health professional education, accreditation, reimbursement, safety, and other objectives. Incentives also could be targeted to particular clinical IT components, such as emergency public health surveillance and computerized medication order entry systems. The costs of investment can be shared by the various healthcare stakeholders and across the public and private sectors.

The conclusions remain as relevant today as they were when the Summit was held in March 2002.

Conclusion

The National Summit on Information Technology and Health Quality reaffirmed the urgency of implementing a national health information infrastructure. Although the participants realized the challenges in reaching this objective, they all agreed on the importance of standardizing the underlying components of healthcare information technology and the necessity of both the public and private sectors working together in this endeavor. There is a recognized need for leadership—in all sectors of healthcare—to champion the implementation of a NHII. Although there was some concern about the Federal government imposing mandates, there was agreement that the Federal government should exercise leadership and use the tools it has available to move implementation forward. The existence of generally agreed upon standards (e.g., HL7, ANSI–X12N and SNOMED), previous recommendations (e.g., from the National Committee on Vital and Health Statistics), and organizations such as the National Quality Forum, which can be the vehicle for gaining broad na-

[1] Power EJ, Kizer KW, Nishimi RY, Gorban LD (eds). *Information Technology and Healthcare Quality: Proceedings of a National Summit*. Washington, D.C. National Quality Forum. 2003.

tional endorsement of IT-related standards, provide the means to make immediate progress.

The National Quality Forum remains committed to making the goals and action plans of the Summit a reality. We look forward to working with the Committee and other healthcare, IT and community leaders to achieve the vision of a "connected" healthcare system.

Thank you for holding this hearing to highlight this issue. The NQF would be pleased to be of assistance to you in your efforts.

Statement of Patient's Healthcare Card

The Patient's Healthcare Card recognized the need more than a decade ago for implementation of information technology in health care to control costs and improve quality of care. Patient's Healthcare Card program is a patent-pending intellectual property with application to the health care industry and is based on technology currently employed by the financial services industry. Patient's Healthcare Card's initial value proposition offers objective, equitable, and efficient management of patient out-of-pocket—co-payments, deductibles, uninsured and underinsured.

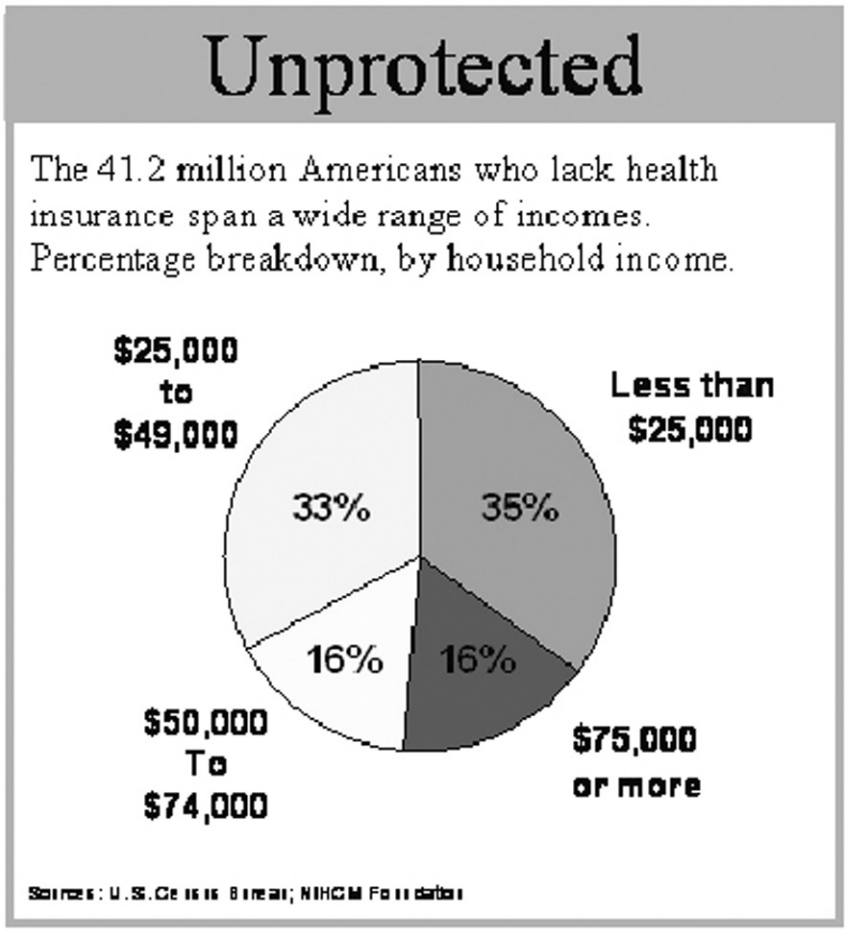
Current Medicaid regulations permit provider reimbursement even though the patient may have the ability to pay some or all of his/her obligation for health care products and services. Patient's Healthcare Card program, as an independent third-party, eliminates conflicts of interest to provide objective, accurate and timely information concerning patients' eligibility for and the amount of public sector benefits.

"For years, doctors and hospitals have lagged behind other industries in joining the information-technology club-and it didn't look like they'd ever sign up," according to Laura Landro in "Healthcare Goes Digital," *The Wall Street Journal,* September 10, 2002. "Because of the unusual payment structure of the health-care industry, providers have never had many incentives to actually improve the quality of their product or install clinical-information systems that would let them manage patient care better." The primary reason is when technology reduces operating costs, duplications, errors and unnecessary care, the financial benefits don't go to the providers but to insurers, third party payers, government, and patients.

Patient out-of-pocket is at the core of escalating costs in health care and offers the greatest opportunity for technology to affect the healthcare delivery system. Out-of-pocket represents 22%, projected to increase to 25% by 2007, of provider revenue; however, providers currently collect less than 20% of the potential revenue. Implementation of existing, reliable, proven systems and methods from the financial services industry adapted to the specific needs of health care's patient out-of-pocket (consumer credit), offers a significant opportunity for patients, government, providers and third-party payers. The Patient's Healthcare Card program can be of service today, not in ten years, with objective and equitable management, in real time, of a patient's ability to pay health care obligations.

Credit experts (Experian, Equifax and TransUnion), based on income of the unprotected, believe collection of patient out-of-pocket can be increased to 50% or greater from the current 20%. Using today's consumer credit technology and systems, an independent third party administrator can objectively evaluate a patient's "ability to pay" (means testing), based on benchmarks established by public policy, and manage that amount equitably at less operating expense. (Appendix 8,9)

U.S. Census Bureau, 2002, data demonstrates the financial capacity of the unprotected to pay some or all of their out-of-pocket responsibilities.



Patient's Healthcare Card

- Providers have the same relationship with Patient's Healthcare Card as participating banks have with the VISA program
- Patent-pending (intellectual property) system and methods
- Provider Account—Healthcare Card program creates a discrete account for each provider
- Patient Account—providers create a singular discrete account for each patient—universally accepted within healthcare
- Healthcare Card program maintains a registry (repository) of each Patient Account for providers
- Secure infrastructure—accurate, complete, current information
- Shared service model—providers share costs ratably (proportionally)
- Patients benefit from single statement billing from all providers—single payment

Federal and State FY 2007: Relief in Medicaid Payments:

(Assuming the same distribution of costs between the federal government [CMS] and states)

In 2002, the Medicaid program cost $245 billion to provide medical assistance (MAP) and $14 billion for administrative costs (ADM). MAP average payments are

currently divided with 57% CMS and 43% states. ADM average payments are divided 55% CMS and 45% states.[1] By 2007, MAP and ADM costs are expected to increase by 5% or more annually, based on prior experience.

Substantial Reduction in Medicaid Payments with Implementation of Patient's Healthcare Card

	Federal (CMS)	State	Total
ADM	$5.8 billion (55%)	$4.7 billion (45%)	$10.5 billion (reduction)
MAP	The precise financial impact cannot be determined at this time due to the variables associated with public policy, data, projections, assumptions, and the amount of long-term care expenses as a percentage of total expense; however, the impact will be significant.		

Reduced Administration Costs

Substantial Reduction in Administration Costs

Patient's Healthcare Card (PHC) offers a substantial reduction in administrative costs; the amount can only be estimated. (Appendix 10, 11, 12, 13, 14) Based on private sector programs in operation for years, the program, using a shared service model and secure internet infrastructure, offers a projected 75% or greater reduction in administrative costs as compared to current systems and methods.

Medicaid's current administrative expense is greater than $300.00 per beneficiary annually.

A typical "quality service provider," such as American Express, operates within parameters:

1. Cost to evaluate financial capacity and establish a new account less than $3.00
2. Cost to maintain account annually $18.00
3. Cost per transaction in the account $.015

American Express' annual cost to establish and maintain an account is less than $25 annually.

Increased Collection—Out-of-Pocket Charges

In a survey conducted of the nation's hospital CFOs, the respondents indicated their own business office was performing below their expectations. Healthcare providers lack the expertise and scale necessary to effectively and efficiently manage patient out-of-pocket (consumer credit). By utilizing proper management and structure, experts (Experian, Equifax and TransUnion) believe out-of-pocket collections can be improved from less than 20% currently to 50% or greater.

Darren Lehrich, an analyst at SunTrust Robinson Humphrey, said in 2003: "Of self-pay business, only 14 percent ends up being collectable and last year it was in the 18 percent range" for HCA Inc. (Appendix 5)

HCA Inc. reported "in their first quarter (2004), the company's provision for doubtful accounts—an indicator of unpaid bills—increased to $694 million, or 11.7 percent of revenue, from $428 million, or 8.1 percent of revenue, a year ago."[2]

Increased Collection—Ability to pay

Illustration of potential financial impact:

Using "ability to pay"—a patient is determined eligible for public sector benefits.

Positive eligibility establishes MAP amount payment to provider—$10,000.

Amount of patient's "ability to pay"—$3,000.

Currently, the provider would receive the MAP amount funded entirely by the public sector (taxpayers)—$10,000—with the patient paying little or nothing.

Implementation of "ability to pay" in compliance with Medicaid policy, permits a patient to have the same eligibility determination, with the public sector (taxpayers) paying $7,000 and the patient paying $3,000.

In the example, the provider will receive the $3,000 owed by the patient at time of service in the form of a working capital loan, with a cost of capital generally at commercial paper rates, from Alliance National Healthcare Receivables Funding Corporation (ANHRFC). Servicing of the provider's working capital loan is accom-

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[1] "The average enrollment for Medicaid was 39 million in FY 2002, about 13 percent of the U.S. population. Nearly 7 million people are dually eligible, that is, covered by both Medicare and Medicaid." CMS Management's Discussion and Analysis FY 2002.

[2] "HCA Blames Uninsured for Income Drop," Reuters, New York: April 22, 2004, Yahoo! News: May 11, 2004.

plished through the patient's monthly payments; monthly payments are intuitive for patients (car payments, house payments, etc.) Additionally, the provider receives (earns) the interest income on outstanding patient balances.

In the example, the patient's positive eligibility determination forces the provider to accept the associated payment code established by Medicaid. The provider receives $10,000 under either payment scheme, from government or government and patient. There is no financial incentive for providers to increase patient out-of-pocket collection. The public sector (taxpayers), as payer of the cost of Medicaid, would be the beneficiary of any opportunity to redirect resources.

Patient's Healthcare Card was positively received in discussions with the American Hospital Association, American Medical Association, and many others. However, providers are concerned that government (taxpayers), federal and state, would be the beneficiary of increased collections. Providers feel they are entitled to some, if not all, of the potential opportunity to redirect resources created from implementation of the Patient's Healthcare Card.

The issue of provider participation in any opportunity to redirect resources must be resolved. The incentive must be sufficient as to promote provider participation and move the healthcare community beyond its institutional ambivalence concerning information technology. An objective of the initial demonstration project(s) will be to determine the amount of incentive providers require to assure full participation of the health care community.

Patient's Healthcare Card Creates An Objective, Equitable, Efficient System

The U.S. Census Bureau, Statistical Analysis of the United States, 2002, Chart No. 112 projects a substantial increase in health care spending to $2.174 trillion. (Appendix 6)

Based on benchmarks established by public policy, Patient's Healthcare Card, as an independent third-party administrator, can objectively evaluate a patient's "ability to pay" (means testing), and service that amount equitably.

Patient's Healthcare Card program, using a shared service model, internet-based application and infrastructure, will provide more accurate and timely information concerning a patient's eligibility for Medicaid benefits. Patients, providers and government benefit when those using the health care system pay their share based on their "ability to pay." Patient's Healthcare Card establishes an auditable national standard for determining eligibility for benefits, eliminates conflicts of interest and brings equity and integrity to the out-of-pocket portion of health care.

With national implementation of Patient's Healthcare Card, CMS and states will have the opportunity to redirect significant resources from MAP and ADM by 2007. (Appendix 1)

Implementation of Patient's Healthcare Card program into the health care delivery system is justified on its initial value proposition as an opportunity for fiscal relief for patients, providers, government, and other third party payers and as a network for claims processing and payments.

Elimination and Streamlining of Operations

Patient's Healthcare Card's use of secure internet infrastructure or approved gateway or EDI service that complies with Alliance National Healthcare Network's (ANHN) reduced fee model moves the administration of the Medicaid program from paper to the digital age at little or no cost to government. The program's systems and methods eliminate or streamline administrative activities within the program at both federal and state levels. The following are some, but certainly not all, activities that change.

Eligibility Validation

Patients will be issued a Healthcare Card with a discrete singular account number. Providers, using a card swipe machine at the point of sale, access the appropriate database via secure internet method or ANHN approved, compliant gateway service to validate eligibility of the patient (Blue Cross & Blue Shield, Charter, Medicare and Medicaid, etc.) Once the card is swiped and the provider validates that the patient who is covered is the individual presenting the Card, eligibility is confirmed, electronically and in real time, to all appropriate parties. Claims rejected due to eligibility can be significantly reduced with real time validation of provider, payer and patient. Additionally, the card swipe system and method are well adapted to the dynamic nature of Medicaid beneficiaries.

Claims Process Flow

Using systems and methods refined in the financial services industry (credit cards), providers file claims via secure internet infrastructure. At time of eligibility validation, a discrete reference number is created, which is applied to a web page to be used for filing the claim. The discrete web page contains transaction data for providers and payers, who can review and edit for any deficiencies, make corrections or any other action required on their part to move any pending claims onward through the adjudication process, without requiring additional action by Medicaid servicing agents or incurring further needless delays.

Claims Status Inquiry (CSI)

Just as a credit card holder is able to track and maintain his/her credit card transactions via secure internet methods, providers can access the discrete web page (reference number) in the same manner and view the status of each discrete transaction (claim).

Claims Status Remittance Advice (ERA)

Pending ERAs for a patient/provider can be delivered to providers as a component of a status inquiry. The notice will avoid/eliminate providers needing to make additional ERA inquiries with the Medicaid service center.

Statement of Lawrence L. Weed, Burlington, Vermont

A deep, fundamental flaw in the infrastructure of the whole medical enterprise is not only not being discussed and corrected; its existence is not even being recognized.

The flaw: The diplomas from medical schools and the licenses to practice from the states could not possibly mean what the public thinks they mean.

The medical establishment and the public still believe that graduate medical education and credentialing as now practiced are adequate for controlling cognitive inputs. On this view, the minds of licensed professionals are central to bringing knowledge from its source in laboratories and libraries to the people who need the application of that knowledge. We have lived with the belief that the unaided minds of those professionals can solve two problems: first, recall and process general knowledge relevant to unique individual patients under time constraints no respectable scientist would ever accept, and second, maintain awareness and control of all the patient-specific data points that good problem solving requires.

The unaided minds of professionals cannot do these things. These difficulties can only be overcome with external tools designed to extend man's cognitive abilities. The tools are as necessary as microscopes and X-rays are necessary to extend the unaided eye. As Francis Bacon saw 400 years ago: "The unassisted hand and the understanding left to itself possess little power. Effects are produced by means of instruments and helps, which the understanding requires no less than the hand".

The field of medicine is where astronomy was centuries ago when it did not have the telescope. And the medical establishment and the government are where the church was when it either refused to look through the telescope or refused to accept what others saw when they did look. New tools for controlling cognitive inputs in medicine have been in existence for over 20 years but that existence has been either ignored or denied.

A 9/11 commission is spending millions of dollars to investigate 3,000 deaths and the failed intelligence system that had not developed the proper tools and infrastructure to "connect the dots" and prevent what may happen again. And yet in medicine we have 90,000 deaths that occur every year and no leaders of the medical establishment are being publicly interrogated on why they persist in the use of such archaic tools for moving knowledge from its source to those who need the proper application of that knowledge. The transmission lines for knowledge are so flawed and the voltage drops across them so great that it boggles the mind that the government and the universities are not only blind to the chaos but are actually providing the licensing laws and educational systems that enable it.

This problem goes far beyond "medical error" as usually conceived. The prevailing medical culture remains in denial about the scope of the problem and the wrenching changes needed to solve it. The consequence is that reliance on the physician's mind stifles use of a superior alternative. For the want of that alternative, cognitive inputs to medical decision making are uncontrolled. For want of controlled inputs to medical decision making, the quality of care, the cost of care, the education and

credentialing of caregivers, and the development of medical knowledge itself, are unmanageable.

The superior alternative is Knowledge Coupling tools. Knowledge Coupling tools make possible a fundamental change in the way we move knowledge from its source in laboratories and libraries to the people who need the rigorous application of that knowledge. The physician's mind is no longer required to be the vehicle for bringing medical knowledge to the point of need in patient care. In turn, medical education and credentialing of providers will have to change from a knowledge-based to a skills-based approach. We must shed the illusions instilled by graduate medical education. Physicians are "educated" to believe that, in Herman Blumgart's words, "The application of knowledge at the bedside is largely the function of the sagacity inherent in or personally developed by the individual physician."

The way physicians are taught to function flies in the face of decades of research in cognitive psychology, decades of research in health care quality, decades of experience in other industries, and common sense. Common sense tells us to rely on maps and a compass or GPS device, not on our sense of direction, when navigating in unfamiliar territory. An airline pilot uses radar; he does not claim to be able to see through clouds. In other areas we have extended our muscles with machines and our eyes with microscopes and telescopes. Similarly, we should extend our cognitive capacities to recall and process the many variables in solving clinical problems. Relying on recall is unsafe, unreliable and unnecessary. We must use technology and system organization to create a rational division of labor, where people and machines are assigned functions to which they are suited. The present infrastructure of the medical system with its flawed beliefs, inadequate information tools, and poorly defined linkages among its parts does not support such a rational division of labor. Until a new infrastructure is put into place, acceptable quality and productivity will remain out of reach.

How much longer can we get away with ignoring not only Francis Bacon, but our own leading cognitive research scientists such has Robyn Dawes who wrote:

> States license psychologists, physicians, and psychiatrists to make lucrative global judgments in the form of 'It is my opinion that . . .' People have a misplaced confidence in their global judgments, a confidence that is strong enough to dismiss an impressive body of research findings and to find its way into the legal system. The greatest obstacles to using external aids may be the difficulty of convincing ourselves that we should take precautions against ourselves. The idea that self—imposed, external constraints on action can actually enhance our freedom by releasing us from predictable and undesirable internal constraints is not a popular one

New premises and new tools have implications for cost and quality of medical care, and in particular for coordination among patients and providers. A few of the many implications are:

1. The gap between the fixed cognitive capacities of physicians and the ever-increasing volume of medical knowledge and technique leads physicians to specialize by body system (musculoskeletal, cardiovascular etc) and by procedure (cardiac catheterization, hip replacement etc). That specialization, however, can at times be a major cause of failures of quality and economy, because the patient's problems and total situation cross specialty boundaries. The cardiac catheterization was done perfectly but the original patient problem of chest pain had its origin in the thoracic spine or the esophagus. The hip replacement may have been done perfectly but the patient died in heart failure. Tolstoi understood this problem when he wrote about Natasha's illness in "War and Peace", "The simple fact never occurred to any of them (the doctors) that they could not know the disease that Natasha was suffering from, as no disease suffered by a live man can be known, for every living person has his own peculiar, personal, novel, complicated disease unknown to medicine—not a disease of the lungs, liver, skin, heart, nerves and so on, mentioned in medical books, but a disease consisting of one of the innumerable combinations of the maladies of those organs". (12) And Francis Bacon understood this when he wrote 400 years ago "And generally let this be a rule, that all partitions of knowledge be accepted for lines and veins rather than for sections and separations; and that continuance and entireness of knowledge be preserved. For the contrary hereof hath made particular sciences to become barren, shallow and erroneous, while they have not been nourished and maintained from the common fountain." (13) In the field of medicine a patient needs a system that defines the role of each provider and the connections among them, using tools to access the current necessary, up-to-date knowledge. Many a patient has suffered because no one

ever "connected all the dots"—a process that only a system, not the unaided mind of the licensed physician, can ever achieve. And that system must be based on: (1) a coherent philosophy of total care over time, (2) powerful tools to extend the hand, the senses, and the mind, (3) disciplined users of the tools, and (4) strong leadership.

2. Rather than helping users cope with information overload in medicine, some electronic information tools exacerbate the problem. Tools that accelerate retrieval of general knowledge without determining its relevance to the unique problem situation at hand overwhelm the mind. The result is to worsen the disorder that results from the failed functioning of the unaided mind when faced with large volumes of information.
3. The only escape from disorder in medicine is the simultaneous routine use by patients and providers of two types of information tool: (1) a front-end tool for applying general knowledge to patient problems, so that the right data can be selected and comprehended efficiently, and (2) problem-oriented medical records, so that all caregivers and the patient are constantly confronted with a complete, organized picture of the whole patient's known medical needs.
4. With the right information tools, it becomes possible for medical education and credentialing to become skills-based rather than knowledge-based. Skills-based credentialing can foster a free market in health professional services in three ways: (1) reducing educational and financial barriers to entry in the health professions, (2) equipping less expensive, non-physician skilled caregivers with knowledge tools that will define when, and only when, it is appropriate for them to exercise their particular skill on a given unique patient, and (3) assuring skillful performance, so that patients and other purchasers can safely choose among competing providers based on non-medical factors (price, location, interpersonal skills) for which no expert advice is necessary.
5. When patients and purchasers access the same information tools on which their caregivers rely, they create an informational environment of transparency and accountability. In that environment, patients become autonomous decision makers and are aware of the degree to which their individual constellation of findings fits the diagnostic and management options that are in the textbooks and journals. At times the match to a classical picture will be very good, whereas at other times it will be poor and there will be much ambiguity. They will learn to tolerate that ambiguity and not be victims of diagnostic notions and unfounded therapeutic schemes. Credentialed caregivers will have little opportunity to generate artificial demand for their own skills. And third party purchasers will have little opportunity to disguise economic decisions as medical ones.
6. The right information tools expose large gaps between the generalizations of "evidence-based" medicine and the realities of unique individual patients. Routine patient care thus becomes a vehicle for refining medical knowledge in ways that expensive, limited population studies and some clinical trials cannot achieve. Patients should no longer hear or read statistical results of the mortality of a given procedure or the effectiveness of a given therapy on large number of patients. They should hear about how closely they match in great detail those patients in whom a given drug or procedure succeeded and how well they match those in whom the drug or procedure failed. Tailoring medical action of this sort to individual patients cannot be achieved without the routine use of new tools. Or put another way, an astronomer without a telescope is a very limited astronomer indeed.
7. The common element of knowledge coupling software, the Problem-Oriented Medical Record (POMR), and skills-based credentialing, is that they permit tight control over provider inputs. Control over inputs is a fundamentally different approach to quality improvement than the prevailing approach of outcome-based comparisons. Outcomes cannot be evaluated meaningfully without controlled inputs, and without reliable outcome studies the development of the science of medicine as well as the science of medical practice are compromised.
8. The POMR and the combinatorial standards of care, and skills-based credentialing, are intended to satisfy the medical needs of patients, not the expectations of physicians. Analogizing these concepts to financial accounting standards in business, medicine lags far behind the business world in developing standards for transparency, accountability and control.
9. The POMR standard was once taught in most medical schools, but is applied now only in fragmentary and diluted form, if at all. PKC's knowledge coupling software is resisted because the combinatorial standard it imposes is alien to the way physicians are trained to function. Skills-based credentialing combined with a system that clearly defines when these skills should be applied, is an-

other alternative to the current training. This, too, may be resisted because it would subject physicians to competition by less expensive caregivers.

10. Giving patients access to the necessary information tools, and demonstrating to them the higher standards of care made possible by those tools, is essential to overcoming the status quo. The difficulty, however, is that the prevailing medical culture blocks awareness and resists disruptive innovations. The outcome is that marketplace demands are diverted to marginal improvements.
11. Change of the necessary magnitude requires four elements coming together: philosophy, tools, committed users, and leadership. The next step is for a few institutions and communities to become models of what patients and skilled caregivers can achieve when equipped with the necessary tools and informed with a clear vision.

Statement of the Honorable David Wu, a Representative in Congress from the State of Oregon

Chairwoman Johnson, thank you for giving me the opportunity to testify this afternoon about an important topic for Oregonians and all Americans—health care information technology.

We live in a time of vast technological advancements—today, our cars have more computing power than the Apollo spacecraft. Yet our doctors have not been able to take advantage of these advancements.

It is not for a complete lack of technology. Clinical decision tools exist today that would allow doctors to pull up the latest research information immediately. But currently, we do not have the systems in place to ensure this technology gets used by our health care professionals.

I am proud that one of the innovative companies in health care information technology is located in the heart of my congressional district. Formed in 2001, Kryptiq aids communication within the medical industry through a Windows-based software system that utilizes secure e-mail. Kryptiq's system adds a layer onto standard email that gives medical professionals the ability to connect workflow, such as patients' medical records, while maintaining privacy.

This is technology that we need to better serve patients and extend health care information to rural areas. But we must ensure that we restructure our health care system to ensure that that this type of technology is not only expanded but that it is accessible to all physicians and health care professionals.

That is why this hearing is so important, and I thank you for holding it. I believe that information is the answer to improving health care. If we use the technology that we have today, we can drastically improve the quality of care we all receive in this country.

I look forward to working with Chairwoman Johnson and the Committee to increase the amount of information generated in and about our health care system, to improve the dissemination of that information to everyone who needs it, and help to build the IT infrastructure that will make that possible.

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