Why Interoperability Matters

Population Health
Incentives EHR *Vocabularies*
Standards **Hospitals** EPs
Exceptions Care Transformation
Certification FHIR Interfaces
HIE *Quality Improvement*
Safety **Interoperability**
APIs Regulation HL7 Timelines Penalties
Accountable Care Organizations **Analytics**
VDT *Information Sharing* ToC
JIRA Validation
eCQM *Systems Engineering*
Care Coordination

Introduction

Hospitals have made enormous strides in recent years in the adoption of electronic health records (EHRs), software systems that create a digital version of a patient's chart. In fact, 75 percent of hospitals employ at least a basic EHR, up from only 9 percent in 2008. EHRs enable doctors and nurses at hospitals to quickly and easily document and review the care they provide, order medications and perform many other tasks. But patients frequently obtain health care services from multiple health care providers in multiple locations, including hospitals, independent physician offices, post-acute care facilities, pharmacies, retail clinics, labs and imaging facilities, among others. To more deeply understand patients' conditions and provide the best care possible, sharing data among providers across the continuum and with patients themselves is critical. Hospitals have made a significant investment to achieve these aims. The American Hospital Association (AHA)

estimates that, between 2010 and 2013, hospitals spent $47 billion annually on health information technology (IT).

A provision of the American Recovery and Reinvestment Act of 2009 (ARRA) was a key driver of EHR adoption; a series of interviews in 2013 and 2014 with key stakeholders found that "there was widespread acknowledgement that ARRA was directly responsible for catalyzing adoption of EHRs into the hospital and ambulatory sectors."[1] It did so by providing financial incentives for the "meaningful use" of EHRs. Meaningful use is measured by a wide variety of system capabilities, including the ability of health care providers to share data about their patients.

The good news: Hospitals are sharing data electronically. A majority of hospitals can send and receive data via an EHR, using a Web portal, or through a health information exchange (HIE), which allows clinical information to be shared across multiple providers in a region or state.

Hospital adoption of electronic health records has increased dramatically in the last five years.
Chart 1: Percent of Hospitals with Basic EHR System, 2010 - 2014
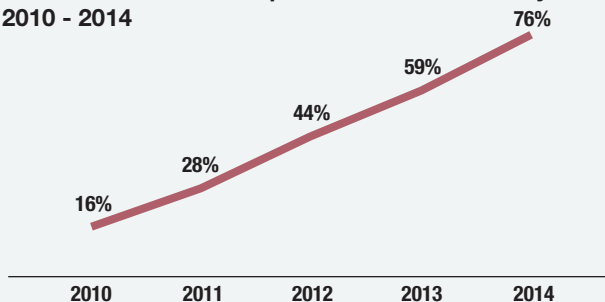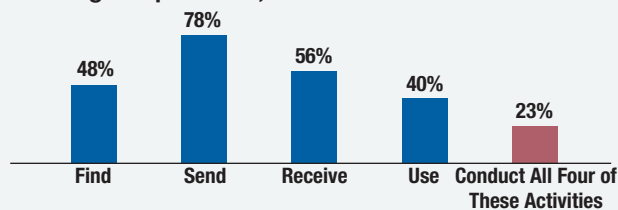

Source: AHA Annual Survey, Health Information Technology Supplement, FY 2010-2014
Note: A basic EHR is defined as having the functionality to electronically manage clinical information on patient demographics, problem lists, medication lists, and discharge summaries; have the ability to computerize provider order entry for medications; and allow viewing of results for lab, radiology, and diagnostic test results. Each function must be implemented in at least one clinical unit in the hospital.

While many hospitals are able to use their current EHR for some activities that promote interoperability, few are able to do all necessary functions.
Chart 2: Percent of Hospitals Reporting Information Exchange Capabilities, 2014

Source: AHA Annual Survey, Health Information Technology Supplement, FY 2014.
Note: "Find" is the only interoperable exchange activity not specific to summary of care records. "Find" refers to query. "Send" and "Receive" include routine exchange using secure messaging using an EHR, using a provider portal, or via health information exchange organization or other third party. "Use" requires that records are integrated into the hospital's EHR system without the need for manual entry.

The bad news: Only 40 percent of hospitals can use the information they receive, meaning that the records are integrated into the hospital's EHR without the need for manual data entry. In fact, only about a quarter of all hospitals can find, send, receive and use electronic information due to substantial barriers.

While health IT tools are essential for building the care system of the future, and hospitals are making significant ongoing investments, too often, the tools are expensive, unwieldy and do not yet support easy information sharing. The current inability for electronic systems to speak the same language to one another and to efficiently and correctly transmit information – to be interoperable – is among the most pressing issues facing health care stakeholders today.

What is Interoperability?

According to the Institute of Electrical and Electronics Engineers, interoperability is the "ability of a system or a product to work with other systems or products without special effort on the part of the customer. Interoperability is made possible by the implementation of standards."

"What we're really talking about is whether data can be moved from one location to another and that the end user can use that information in a meaningful way," said Laura McCrary, executive director of the Kansas Health Information Network (KHIN), a private HIE run by the state's hospitals and doctors.

The national scope of the problem and policy implications were recently outlined in Achieving Interoperability that Supports Care Transformation, a report of the AHA Interoperability Advisory Group. The report also includes recommended action steps for both the public and private sectors. A variety of studies suggest the nation can achieve sizable savings by improving interoperability. For example, researchers at Children's Hospital Boston examined 85 patients transferred from one hospital to another over a 12-hour period and found that a lack of interoperability between their EHRs resulted in non-clinically indicated, duplicative testing among 20 percent of the patients."[2] Another study estimated that use of EHRs can result in a net benefit of $86,400 per physician over five years through benefits accruing from savings in drug expenditures, improved utilization of testing and improved billing practices.[3] Researchers at the Regenstrief Institute

for Healthcare in Indiana found that providers ordered fewer tests when presented with results along with the time interval between first and last tests.[4]

The lack of interoperability shows up in many ways every day at hospitals across the country:

• Critical fields in a care summary are missing when a nurse at the receiving hospital opens and reviews it.
• Values in a lab report incorrectly appear in the wrong section.
• Inability to share details about care provided to a patient in a hospital with subsequent providers, such as a skilled nursing facility (SNF), inpatient rehabilitation facility (IRF), or home health agency (HHA).
• A specialist's report to a hospital that somehow turns from English into gibberish.

Hospitals across the country are engaged in the complex business of coordinating care across different settings, engaging patients in their own care, which improves outcomes, and protecting the public health by reporting a wide variety of data to county, state and federal authorities. These activities all require linking information systems within the hospital, hospital system and to many other entities, such as doctors' offices and the Centers for Disease Control and Prevention (CDC). Unfortunately, there is no superhighway to do so and, as a result, hospitals must employ a wide variety of workarounds, resulting in incomplete information sharing and significant costs. Indeed, a recent report by the Government Accountability Office (GAO) found that costs and other factors, including loose standards, are major barriers to improved interoperability.[5]

Care Coordination

Accurate data, including from health plans and providers across the continuum, are critical if care coordination is to take place. Care coordination is "the deliberate organization of patient care activities between two or more participants (including the patient) involved in a patient's care to facilitate the appropriate delivery of health care services," according to an expert report written for the Agency for Healthcare Research and Quality (AHRQ).[6]

"Interoperability is vital," said Meg McElroy, program manager for ARRA and ICD-10 at Ascension Health, one of the nation's largest health systems. "The patient population is so transient now. Patients should have the ability to go where they want to go and our obligation is to take care of them and get it right."

Crucial to care coordination is that it is "managed by the exchange of information among participants responsible for different aspects of care,"
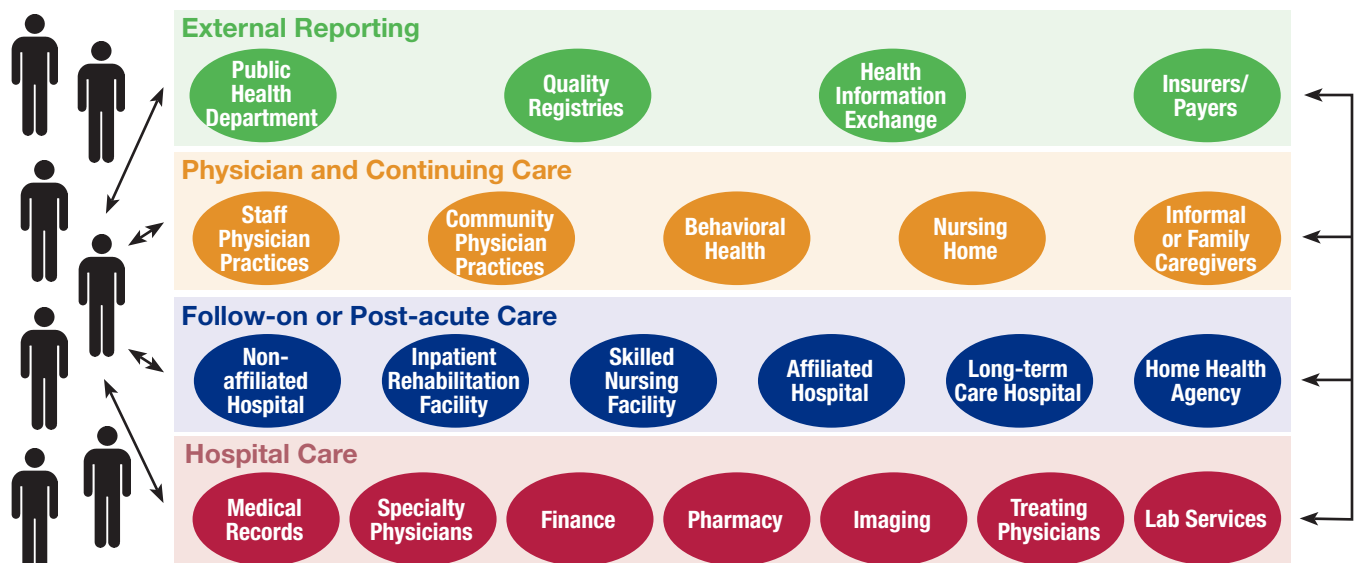
according to the AHRQ report.[7]

Consider the millions of elderly Americans who suffer from cardiovascular disease, hypertension and diabetes. In the course of a year, they may:

- Experience a hospital stay.
- Have an ambulance take them to the emergency department.
- See a general practitioner, a cardiologist, an endocrinologist, and a geriatrician at their offices.
- Get a vaccination at a retail clinic.
- Take eight to 15 medications from different retail pharmacies and a pharmacy benefit management company.
- Get an MRI at a free-standing MRI center.
- Participate in telehealth monitoring, such as wireless weight scales or wearable activity trackers.
- Utilize informal caregivers for non-acute care needs.
- Experience a reportable disease or infection.
- Require care from a post-acute care provider, such as a long-term care hospital (LTCH), IRF, SNF or HHA.

Care coordination requires information exchange among many parties.

Chart 3: Entities that May Commonly Need Access to Patient Care Data in a Coordinated Care Environment

External Reporting

Public Health Department · Quality Registries · Health Information Exchange · Insurers/Payers

Physician and Continuing Care

Staff Physician Practices · Community Physician Practices · Behavioral Health · Nursing Home · Informal or Family Caregivers

Follow-on or Post-acute Care

Non-affiliated Hospital · Inpatient Rehabilitation Facility · Skilled Nursing Facility · Affiliated Hospital · Long-term Care Hospital · Home Health Agency

Hospital Care

Medical Records · Specialty Physicians · Finance · Pharmacy · Imaging · Treating Physicians · Lab Services

Now multiply the above examples by the more than 5,000 hospitals and 750,000 doctors in the country, not to mention all of the other types of providers and countless public health entities this information flows to, to get a sense of the problem. For all of these providers to deliver the most effective care, it is critical that they know and understand the entire spectrum of care a given patient is receiving, ideally in real time.

It also is critical for containing the overall cost of health care, as the Boston Children's and other studies show. Efforts to reduce costs while improving care are the primary goals of alternative payment arrangements such as accountable care organizations (ACOs) and bundled payments for episodes of care, which are gaining traction with Medicare and private health plans. Successful participants in such alternative payment programs share in the savings they achieve for Medicare 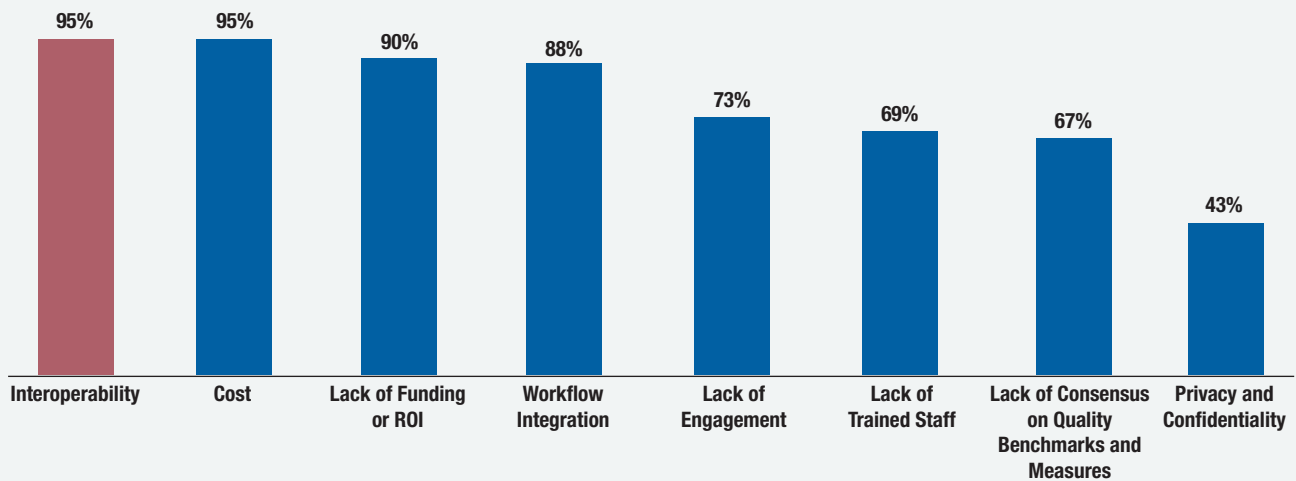or private health plans. As such, without under-standing the full spectrum of care a patient is re-ceiving, an ACO or a physician responsible for an entire episode of care is doomed to failure, said Matthew Spielman, product manager at InterSys-tems Corp, which provides data management, connectivity, and analytics services to a wide variety of clients, including hospitals.

"As we try to go to more accountable care, you can't do that effectively without being able to share all of the data," Spielman said. "If you can't establish that longitudinal patient record, it becomes much more difficult to manage the care of the patient."

The current state of interoperability doesn't bode well for the success of ACOs, according to a survey of 62 ACOs by Premier, Inc., a health care performance improvement alliance of 3,400 U.S. hospitals. Ninety-five percent of those surveyed cited interoperability as a challenge to leveraging their investment in EHRs and other health IT.[8]

Interoperability is almost universally seen as a major obstacle to effectively using and meeting the potential of health IT.

Chart 4: Percent of ACOs Reporting Largest Barriers to Using Health IT Effectively, 2014

Interoperability	Cost	Lack of Funding or ROI	Workflow Integration	Lack of Engagement	Lack of Trained Staff	Lack of Consensus on Quality Benchmarks and Measures	Privacy and Confidentiality
95%	95%	90%	88%	73%	69%	67%	43%

Source: Premier, Inc. and eHealth Initiative survey of accountable care organizations fielded July – August 2014. 62 organizations responded to the survey.

Atlantic Health Faces Challenges with Interoperability Outside its System

Atlantic Health System, a five-hospital system headquartered in Morristown, N.J., struggles with poor interoperability daily. While its internal IT infrastructure is highly sophisticated, allowing it to share data among its hospitals, affiliated doctors' practices, rehabilitation facilities and other providers, the system must work with hundreds of independent doctors, labs, SNFs and other providers that may have rudimentary technology with poor interoperability.

"That's what's killing us; we're straddling two worlds," said Linda Reed, chief information officer of Atlantic Health. Reed described a fictional patient undergoing hip surgery and how information flows among providers.

Jenny Walker, a 70-year old woman on Medicare, needs hip surgery. Typically, she would talk about her hip complaint with her primary care doctor, who would do an exam and refer her to an imaging facility and then to an orthopedic surgeon. The surgeon would then probably order more imaging and blood work and refer her to the scheduling team at one of Atlantic Health's hospitals. The

scheduling team would get Jenny pre-registered and might request additional testing. Jenny would then come to the hospital for the procedure, which would be documented in the hospital's EHR. After the procedure, doctors and nurses would generate orders for Jenny to be discharged to a rehabilitation facility and communicate the details of her care back to her primary care physician.

If Jenny stays in the Atlantic Health system all the way from her primary care doctor to the rehabilitation facility, all of the data will seamlessly flow from one provider to the next using a series of connections, called interfaces, among the scheduling system, the hospital EHR, the rehab EHR and other systems.

If she does not, Atlantic Health will receive much of its data in bits and pieces from outside providers electronically but frequently have to resort to regular mail and faxes. Nurses, doctors and others will have to manually piece together all of this data in the hope of forming a coherent picture of the patient, frequently making follow up calls for more data or data they cannot understand.
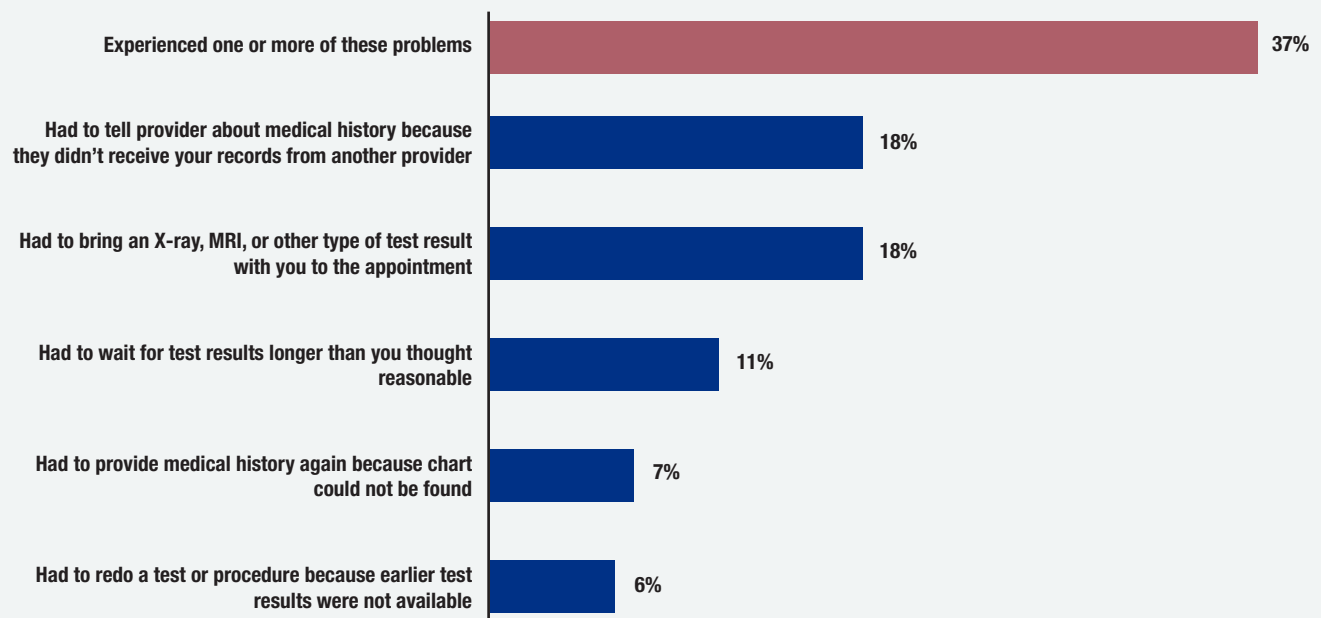
Patient Engagement

The lack of interoperability across health care providers is a barrier to advancing another key factor in optimal care: patient engagement. A critical factor in engaging patients is empowering them with meaningful information about their health, including providing them with a summary of the care received, labs, medications, images, etc. Such information is particularly important when patients want to engage in shared decision-making with their physician regarding a plan of care or course of treatment. Patient engagement also is a requirement of federal regulations on how to use EHRs.

But most patients "still cannot gain electronic access to their health information," according to the study prepared for AHRQ.[9] Indeed more than a third of patients experienced a gap in information exchange.

But that is only a small part of the issue. The real problem is that the vast majority of patients cannot access their health information in a holistic, meaningful way. Instead, they must go to each of their providers' patient portals and download unintegrated data. Making sense of this, particularly for patients with multiple chronic conditions who frequently have many health encounters a year, is difficult.

Over one-third of individuals report experiencing additional burden due to problems with provider information exchange.

Chart 5: Percent of Individuals Experiencing One or More Gaps in Health Information when Seeking Care for a Medical Problem, 2013

Experienced one or more of these problems	37%
Had to tell provider about medical history because they didn't receive your records from another provider	18%
Had to bring an X-ray, MRI, or other type of test result with you to the appointment	18%
Had to wait for test results longer than you thought reasonable	11%
Had to provide medical history again because chart could not be found	7%
Had to redo a test or procedure because earlier test results were not available	6%

Source: 2013 Consumer Survey of Attitudes Toward the Privacy and Security Aspects of Electronic Health Records and Health Information Exchange.

Citizens Memorial Provides Patients and Providers an Integrated System

Bolivar, Mo., has a population of just over 10,000 people but its hospital, Citizens Memorial Hospital (CMH), has been on the leading edge of health IT. It began to invest in EHRs and interoperability in 2000. Recognizing its relatively small pocketbook, it shunned so-called "best-of-breed" IT and decided to invest in one system that could be used for all of its care settings, including in the hospital, outpatient offices, physician practices, home care, hospice, long-term care and emergency services, said Denni McColm, chief information officer. The result: "Physicians can trend across all settings," McColm said.

Over the years, it kept investing, including offering its EHR and related services to independent physician practices and other providers in an eight-county region. "Our strategy was that we want to do this collectively," McColm said.

or exchanged easily. First, there are independent care providers with their own EHRs, including dentists, optometrists, an OB/GYN clinic and a cancer center. While CMH interfaces with those systems in rudimentary ways, such as sending orders or results between systems, patients must get their full records from those individual practices. Second, two hospitals in the region have never sent CMH data in a widely accepted content standard known as Consolidated Clinical Document Architecture (C-CDA), though both systems have signed on to the Missouri state HIE, which CMH intends to join in hopes of facilitating exchange with those systems. Finally, CMH acquired a physicians group that had a different EHR. When it tried to integrate its patient records, "we had to hire a third party" to fully integrate the important data and preserve continuity of patient care, McColm said.

Another benefit of this approach is that it allows CMH to offer its patients an integrated view of their health, which increases patient engagement. MyChart, the hospital's patient portal, requires patients to sign in only once to get access to labs, medications, care encounters and much more from the vast majority of providers in the area.

But that does not mean all clinical data are exchanged

Screen Shot of Citizens Memorial Hospital Patient Portal

# Reporting Public Health, Quality and Patient Safety Data

A lack of interoperability also impedes public health reporting. Such reporting is critical to the overall health of the public and can provide health researchers with long-term data sets. Hospitals are required to report to county, state and federal authorities, including the CDC, a wide range of public health data, including communicable diseases such as mumps and meningitis, immunizations and certain lab results. Hospitals are happy to report this data to improve public health but must contend with a wide variety of reporting formats and transmission technologies to do so, including faxing, mailing, e-mailing, web forms and secure file transfer protocols. As a result, hospital workers must manually enter data, resulting in high compliance costs and prolonging the time it takes to report data.

Just as important, hospitals must report a wide variety of process and outcome quality measures to state and federal agencies, such as the Centers for Medicare & Medicaid Services, as well as to private health plans (Chart 6). In fact, "thousands of measures are in use today to assess health and health care in the United States," according to the Institute of Medicine.[10] Hospitals can be penalized for not reporting such data, including infection rates, readmission rates, and whether certain drugs and procedures were administered in a timely fashion. When EHRs were developed, some dating back to the 1970s and 1980s, they were designed as the digital analog of a paper chart. As quality reporting requirements from regulators, payers and accrediting bodies increased over the past five to 10 years, hospitals increasingly sought to leverage EHRs to automate the manual process of reporting quality measures. EHR vendors have made some progress in terms of upgrading their technology to perform quality reporting, but to a great extent, hospitals still must engage in time-consuming and costly manual workarounds. This has implications for quality improvement and patient safety as quality metrics are crucial to continuous improvement in care delivery.

Hospitals must report data to a multitude of quality measurement agencies and organizations.

Chart 6: National Clinical Quality Reporting Demands on Hospitals
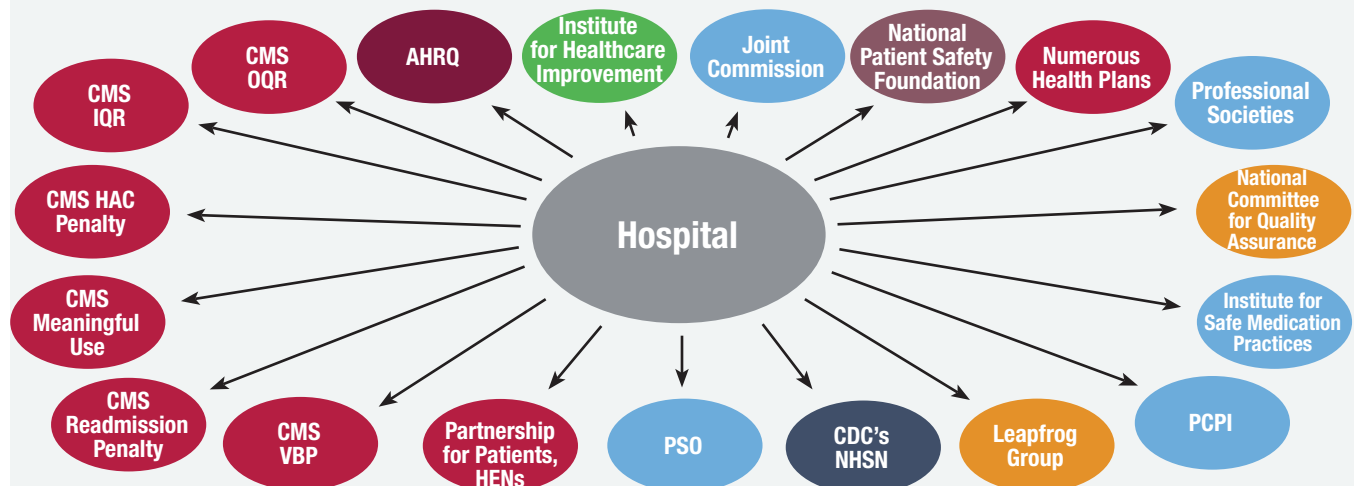
Interfaces

Confronted with poor interoperability, hospitals must find ways to make information flow internally, and to and from outside sources. Typically, they build or license interfaces. Interfaces are software programs that allow a hospital to import or export data such that it can be meaningfully understood and used by health care professionals. Internally, interfaces allow a hospital's EHR, lab, admit/discharge/transfer, medical devices, picture archive communication system and many other systems to seamlessly send data to each other. Interfaces also are used to obtain information about patients from a wide variety of outside providers, including physicians, labs and SNFs.

Unlike the seamless interoperability consumers are used to with their computers or smart phones, in health care, each interface currently is like a snowflake: it must be built to meet the unique requirements between two providers and cannot be reused. No reliable numbers exist about the number and type of interfaces a typical hospital must employ. However, a single hospital using a fully integrated EHR across care settings may use a few dozen, while a large health system with many sites can employ hundreds or even thousands. The hospital then must employ internal IT staff and/or staff from the vendor or a third party to install, customize, test and deploy the interface at an additional cost. Moreover, such interfaces must be routinely upgraded to align with changes or upgrades in other information technology and systems within the hospital. Depending on the vendor, there also may be additional fees for ongoing maintenance for each interface, or fees based on the volume of data transfers.

Truman Medical Centers, a two-hospital, 600-bed, not-for-profit health care system in Kansas City, Mo., has more than 55 connections to external organizations with which it must interface to transmit health data information, according to Mitzi Cardenas, senior vice president for Strategy, Business Development and Technology. Cardenas estimates that the average cost of an interface is $10,000 to $20,000. However, the expense is not limited to the cost of the interface. "In order to align our technology with these outside connections we have hired highly skilled employees," she says. "Making sure this important information is received consumes significant time, but is necessary to meet regulatory reporting requirements and allow data sharing with labs and insurance companies, among others."

As providers move toward implementation of care coordination models, far more complicated interfaces will be necessary to accommodate data exchange. As the complexity of hospitals' accompanying data architectures increase, so will the costs to maintain and operate them – some hospitals report spending $25,000-$50,000 for interfaces that exchange information on electronic documents to improve continuity of care and $50,000-$75,000 per interface for functions such as pharmacy dispensing.

"The typical hospital has a 5 percent margin," said Jennifer Mazzucca, senior health care analyst at Gartner, Inc. "They don't have the resources to make the investment needed or the technology resources to do the implementation as well as delivering care. You're looking at organizations that are too taxed."

Are Health Information Exchanges the Answer?

HIEs are another way hospitals have sought to overcome interoperability barriers. HIEs are dedicated to the secure exchange of health-related data. At their core, HIEs seek to track information about patients wherever they go for treatment and provide that information in a meaningful way to clinicians at the point of care. HIEs come in several models: community-based health information organizations (HIOs), statewide exchanges and health care delivery organizations. Many statewide exchanges were created by states and are therefore public, while health care delivery organization-based exchanges are generally private.

Since the passage of ARRA, there has been a flurry of new HIEs, both public and private. In its eleventh survey of HIEs, the eHealth Initiative received 135 responses, including 74 from community-based HIOs, 26 from health care delivery organizations and 24 from statewide efforts. Among the survey's key findings:[11]

• 38 percent of respondents said that the technical difficulty of building interfaces was their greatest barrier to interoperability.
• 83 percent of respondents have constructed multiple interfaces.
• 50 percent of respondents reported getting EHR vendors to develop interfaces in a timely manner is a challenge.
• 73 percent of respondents said the financial cost of constructing interfaces is an "especially burdensome challenge, which may ultimately threaten sustainability."

It's not just costs that have threatened the sustainability of some HIEs; many were funded by federal grants and have not developed a business model for self-sufficiency when federal grants end. According to the eHealth Survey:

• 13 percent are unsure how they will replace grant funds.
• 33 percent of HIEs receive enough revenue from dues and fees to cover operational costs.
• 28 percent receive funding through dues/fees, but additional funding is needed.
• 66 percent expect that dues or fees will eventually be their primary revenue stream.

"We started off with all of these government supported HIEs and a lot of them have been stumbling," said Colin Buckley, operations director at KLAS Enterprises, which assesses EHRs and other health IT software.

" We started off with all of these government supported HIEs and a lot of them have been stumbling "

– Colin Buckley, KLAS Enterprises

"You're seeing many of those state-run exchanges putting out [requests for proposals] for someone to run them," said Laura McCrary from KHIN. Others, such as Wyoming's HIE, CareSpark, a regional HIE in Kingsport, Tenn., and Connecticut's HIE, known as HITE-CT, all shut down, partially due to the end of federal funding.[12,13]

In addition to having a sustainable business model, provider engagement is critical to the success of HIEs. Hospitals may participate in multiple HIEs; however, the costs to participate in an HIE vary and may be substantial. Truman Medical Centers is engaged with more than one HIE. Annual costs for a hospital Truman's size can range from $95,000 to $200,000 per HIE.

HIEs were created with the best of intentions but were not created with a larger goal: seamless, national exchange. The result? There is no national network of HIEs in which a snowbird from Minneapolis can have her doctor in Phoenix review her records. Moreover, even the most successful HIEs are not fully delivering on information exchange and, in some parts of the country, exchange is not happening at all.

Provider Engagement Key to Successful HIEs

Created by the Kansas Hospital Association and the Kansas Medical Society, KHIN alerts doctors when patients are admitted anywhere among its members. In addition, it provides direct messaging, a secure method of sending health information among providers and serves as the main engine of public health reporting for its members.

KHIN is currently negotiating with a large private health plan to obtain medication data, including prescriptions written, filled, picked up and not picked up.

"About 50 percent of prescriptions don't get filled," McCrary explains. "We're working really hard with payers" to find patients that aren't adherent to their medication regime and improve outcomes.

Building KHIN has not been easy. McCrary estimates that it needs to build three to five interfaces for each of its 76 hospital members and others, including public health agencies. To fund operations, KHIN charges members an annual fee, ranging from about $10,000 for a critical access hospital to about $120,000 for a large academic medical center.

McCrary attributes KHIN's success to providers, who comprise the board.
"You have to have the doctors and hospitals on board to make it work," McCrary said. "If you don't have that kind of provider support, your exchange isn't going to be successful."

The Indiana Health Information Exchange (IHIE) also heavily depends on engaged providers for its success, said Chuck Christian, vice president of Technology and Engagement.

Like KHIN, IHIE sends alerts to doctors if their patients go to a hospital. It also transmits reportable lab and syndromic surveillance data to the state Department of Health. Its main service, Docs-4Docs, is an electronic results delivery service for lab results, radiology reports, transcriptions and other reports. IHIE connects 106 hospitals and about 25,000 clinicians. In the first half of 2014, it delivered 92 million clinical messages and has integrated with 33 different EHRs.

A former chief information officer (CIO) himself, Christian is unhappy about some vendors who charge fees to hospitals and other providers who want to connect to IHIE.

"It's just ridiculous," Christian said. "It's not like they have to do a lot of development work" given that the vendor has already developed the interface and merely needs to tweak it for a new customer.

How Standardized are Health IT Standards?

Standards are supposed to make life easier. They set out ground rules that everyone is supposed to play by and are why any USB flash drive in the world will fit into any USB port. In the world of health care, however, some standards are so loosely defined and interpreted as to make them barriers to interoperability. Take consolidated clinical document architecture (C-CDA), which helps providers send patient reports to each other with defined fields, such as medications and allergies. In theory, if one EHR sends a C-CDA to another EHR, it should be easily ingested such that any doctor or nurse reading the report will be able to understand and use the information that is sent.

But that is far from reality according to a study in 2014 by researchers at Lantana Consulting, Harvard Medical School and elsewhere. The researchers asked multiple EHR vendors to create C-CDA samples. For the 21 vendor samples they analyzed, the researchers found a total of 615 errors in them, including incorrect data, terminology misuse or omission and many other problems, some of which could "disrupt vital care activities, such as automated surveillance for drug-allergy interactions." The researchers concluded that "…C-CDA documents … omit key clinical information and often require manual data reconciliations during exchange."[14]

"It's not so much a problem with vendors as with the standard itself," Buckley said. "You can cram a lot of information into those fields. "Having to use that information is a whole other story."

Electronic health record systems often embed technical errors that create barriers to interoperability.
Chart 7: Number of Technical Errors Found in Samples from 26 EHRs

Type of Data	Total Errors Found
Incorrect data within XML elements	97
Terminology misuse or omission	142
Inappropriate or variable XML organization or identifiers	110
Element optionality through inclusion or omission	161
Problematic reference to narrative text from structured body	45
Inconsistent data representation	52
Not elsewhere classified	8
Total Errors	615

Source: D'Amore JD, et. al. J Am Med Inform Assoc 2014;21:1060-1068.

It is not only a problem with C-CDA. Health Level Seven International (HL7), a standards development organization, has developed standards for exchanging messages among information systems that implement health care applications. In developing these standards, it created the "Z segment," which has resulted in additional problems. HL7 Z segments contain clinical data that the HL7 Standard may not have defined in other areas, serving as a catch all for data that does not fit into the HL7 Standard message definitions.

"The HL7 Z segment is the classic case where a standard isn't a standard," said Ernie Hood, senior research director at the Advisory Board and former CIO of Group Health Cooperative of Puget Sound. When developers were trying to create HL7, Hood explained, they were at a loss about how to "accommodate things that don't fit" into the main HL7 standard. So they came up with a Z segment that allows for custom, proprietary data. The problem is that when

hospital A receives such data from hospital B, it has no idea what the data in the Z segment mean, so hospital B must separately tell hospital A what it is sending, he said.

Finally, providers do not collect data in uniform ways, Hood said. Doctors and nurses do not necessarily use the same exact terminology when they input problem lists (a list of problems patients report to their doctors), allergy lists and medications, such as dosage units, he said.

"I have yet to meet a nurse that doesn't groan when you mention medication reconciliation," Hood said, describing the process of listing all drugs a patient is taking and comparing it against all orders from a physician. "Orders can vary widely in terms of dosing units and instructions," he said.

True standards are critical, said Meg McElroy from Ascension Health — "Interoperability has to start with clear, concrete standards. You have to have a level playing field to play on."

" Interoperability has to start with clear, concrete standards. You have to have a level playing field to play on."

– Meg McElroy, Ascension Health

Conclusion

Hospital adoption of EHRs has surged as a result of the passage of ARRA, and EHRs have become a critical part of the infrastructure needed to improve care coordination, engage patients and improve public health. However, the nation is still a very long way from fully tying them together to help providers meaningfully use information at the point of care to help patients get better and save money. This lack of interoperability is costly to patients, taxpayers, hospitals and others.

Hospitals have tried to overcome interoperability barriers through the use of interfaces and HIEs but they are, at best, costly workarounds and, at worst, mechanisms that will never get the country to true interoperability. While standards are part of the solution, they are still not specified enough to make them truly work. Clearly, much work remains, including steps by the federal government to support advances in interoperability. Until that happens, patients across the country will be shortchanged from the benefits of truly connected care.

Policy Questions

1. To what extent should the federal government fund the enhancement of standards that advance interoperability?

2. How can stakeholders adjust standards to improve interoperability?

3. What actions can be taken with vendors to encourage them to enhance interoperability to meet the priorities set by hospitals, health systems and other providers?

4. What actions can stakeholders prioritize to advance a national infrastructure that is built on a network of networks?

Endnotes

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