Healthcare IT Challenges and Opportunities

Computerization is slowly improving healthcare processes, but it’s a long way from living up to expectations.

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FROM THE EDITORS OF COMPUTERWORLD
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It’s been 19 years since the prestigious Institute of Medicine urged greater adoption of computer systems in healthcare, and more than six years since then-President George W. Bush declared, “By computerizing health records, we can avoid dangerous medical mistakes, reduce costs and improve care.”

So, how are we doing so far?

There are positive signs at places like Methodist Dallas Medical Center, which has a nearly foolproof way to make sure the right drug gets to the right patient in the right dose at the right time: It uses bar-code technology to clear all medications through a computerized program.

Pamela McNutt, CIO at Dallas-based Methodist Health System, says the technology means the hospital can avoid drug errors, which are responsible for an estimated 100,000 deaths nationwide each year.

That success encouraged McNutt to push forward with other IT initiatives. “The reason we continue getting everything into an electronic format is so we can analyze our data, look at what’s going on for efficiency reasons and monitor quality as it’s happening,” she says. “And the only way you can do that is through the use of structured data.”

While there are many success stories, progress in using IT to improve patient care and cut costs has been slow. Research suggests that healthcare IT has a long way to go to match the hype:

■ Only 12% of U.S. hospitals had adopted electronic health records (EHR) as of 2009, a modest increase over an adoption rate of 9% in 2008, according to researchers at the Harvard School of Public Health.

■ A study by University College London found that many EHR projects fail, and “the larger the project, the more likely it is to fail.” Researchers say the systems can improve auditing and billing but may make primary clinical care less efficient.

■ Experts from the Institute of Medicine who visited healthcare facilities in 2009 found that “care providers had to flip among many screens and often among many systems to access data; in some cases, care providers found it easier to manage patient information printed or written on paper.”

Healthcare CIOs say they’re optimistic that IT can help to dramatically improve patient care, but it will take time. And the types of challenges that IT leaders face in all industries — such as high equipment costs and end-user resistance — could limit what IT can actually deliver and how fast it can do so.

“This is really going to take a lot of work and a lot of evolution. It’s going to take a little bit of carrot, a little bit of stick and time to get there,” says William Spooner, CIO at Sharp HealthCare in San Diego.

The U.S. government is providing the carrot and the stick. The American Recovery and Reinvestment Act of 2009 provides $19 billion in incentives to health care providers that demonstrate they are engaged in “meaningful use” of EHR systems, but providers that don’t meet the government’s meaningful-use guidelines by 2015 face cuts in their Medicare reimbursements.

“Getting hospitals to start using EHRs is critical,” says Ashish Jha, associate professor of health policy and management at Harvard. “Paper-based medical records lead to hundreds of thousands of errors each year in American hospitals and probably contribute to the deaths of tens of thousands of Americans. This is not acceptable. There is overwhelming evidence that EHRs can help, yet the expense and the disruption that implementing these systems can cause has forced many hospitals to move slowly.”

One well-known reason for adopting EHR systems is that they could enable health professionals to access a patient’s medical history anytime, anywhere. Such access would even be available to a doctor treating a patient who needs emergency care while far away from home.

In addition, Spooner says computerized systems can alert doctors immediately when a patient’s lab results indicate something abnormal, allowing caregivers to act quickly to prevent complications. And some systems can compile patient data onto dashboards at hospital nurses’ stations, so the nurses can see all information at once, rather than having to check charts room by room.

Analytics for Healthcare

 Experts say that an even more powerful use of electronic records would be to analyze large groups of patients, track
### TIMELINE: Healthcare Reform and IT

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tr>
<td>1967-1973</td>
<td>The earliest electronic medical record systems are developed at the University of Vermont, Intermountain Healthcare in Utah, the Regenstrief Institute in Indiana, Kaiser Permanente in San Francisco, and Massachusetts General Hospital in Boston.</td>
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<td>1991</td>
<td>An Institute of Medicine report calls for computerization of patient records by the year 2000.</td>
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<tr>
<td>1993</td>
<td>President Bill Clinton proposes a major healthcare reform plan, including a medical ID card, but it isn’t enacted.</td>
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<td>1997</td>
<td>The Health Insurance Portability and Accountability Act requires privacy and security safeguards for health records.</td>
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<td>2004</td>
<td>President George W. Bush sets a goal to make electronic health records available to most Americans in the next 10 years.</td>
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<td>2009</td>
<td>A report by the Institute of Medicine urges the healthcare industry to increase its focus on using IT to improve clinical decision-making.</td>
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<tr>
<td>2009</td>
<td>Federal economic stimulus legislation encourages the adoption and “meaningful use” of electronic health records.</td>
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<tr>
<td>2010</td>
<td>President Barack Obama signs healthcare reform legislation that has numerous provisions affecting IT.</td>
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Trends, identify best practices and determine the best treatments. “That’s the ultimate goal: to discover patterns in the population you wouldn’t otherwise,” says David Muntz, CIO at Baylor Health Care System in Dallas.

That’s the goal, but we’re far from it because of problems with data sharing, says Timothy Stettheimer, regional CIO at St. Vincent’s Health System in Birmingham, Ala., and chairman of the board of trustees of the College of Healthcare Information Management Executives.

Not all healthcare providers have electronic records, many organizations can’t share their records with other facilities unless they’re affiliated with one another, and even those that can share with others outside their networks often have translation problems because there’s no single data standard to facilitate the smooth transfer of information.

“That’s one of the things we’re struggling with — the vocabularies, diagnostic codes, nomenclatures. There are a lot of them, and we’re trying to bring them together,” Stettheimer says. “There are a lot of efforts going on to create the ability to share information, but we’re not there yet.”

It may be 10 or 15 years before data sharing is widespread, because it’s “a lot harder to achieve than most people appreciate,” says Peter Gabriel, director of informatics at the University of Pennsylvania School of Medicine’s Department of Radiation Oncology.

One looming issue is whether people will trust that their electronic medical records will be secure and private while all this data sharing goes on. Polls show that consumers are concerned that employers and marketers might gain access to their health records, for example.

The counterargument is that electronic records can be more secure than paper ones. Many computerized health record systems already use multilevel access controls that can limit who can view specific information, and some provide audit trails that show who accessed what details when.

But still unresolved are questions about how patients’ records will be handled — and how they want their records handled. Should they be able to opt into a system of shared electronic records, or should they have to opt out? And who will be the owners and custodians of the information — the patients themselves, or the caregivers or facilities that created the data?

**Will IT Cut Medical Costs?**

Healthcare IT professionals expect that technology will not only improve patient care, but also deliver savings, by streamlining processes and eliminating costly mistakes. “We have known since at least the 1990s that the highest-quality care results in the lowest-cost care,” says Aaron Seib, CEO of the National eHealth Collaborative, a public-private partnership promoting a nationwide health information system.

McNutt says her hospital’s prescription bar-code system is an example of a cost-cutting technology. By eliminating drug errors, it cuts out the treatments that would have been needed if a patient had been given the wrong medicine. McNutt acknowledges that eliminating those treatments saves money for the insurer, not the hospital. But she also points out that the system helps the hospital avoid costly lawsuits stemming from drug errors.

As the government moves toward a new reimbursement model — one that pushes the cost of treating problems caused by poor care, such as hospital-acquired infections, back onto the providers — IT systems could deliver even bigger returns, McNutt says.

Still, there’s a rub when it comes to calculating return on investment in healthcare IT. Often, the cost savings from the use of technology don’t go to the owner of

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**Timothy Stettheimer**, Regional CIO, St. Vincent’s Health System
the technology but to another player in the healthcare system, like the insurers.

Stettheimer lays it out this way: A patient comes into the hospital at night with heart trouble. Rather than calling a local cardiologist and waiting for a response, the staff sends test results to offshore medical personnel for an immediate evaluation. That quicker response means treatment can start sooner, often leading to a better and less costly outcome. But in that case, the hospital doesn’t necessarily see the financial benefit; the insurance company — and the healthcare system as a whole — does.

A CIO at a for-profit company would have a hard time getting approval for an IT investment that saves money for the industry but not for the company.

“The incentives [in healthcare] are not aligned at all. In fact, there are perverse incentives there,” Stettheimer points out.

“That’s very simplified, but it’s a problem we need to overcome.”

New payment models will help healthcare facilities big and small see the financial rewards of investing in IT, he says. Medicaid and some other insurers are paying healthcare providers by the condition, rather than per treatment or per day in the hospital. Those payment arrangements give doctors and hospitals incentives to deliver the best, most efficient care.

The new payment schemes are more likely to save big bucks than IT advances alone would, Gabriel says. “I’m a big proponent of healthcare IT, but I don’t see a lot of evidence that information technology will save the healthcare system money,” he says.

**The Affordability Factor**

Many financially strapped medical facilities have a hard time generating the upfront capital required to invest in IT in the first place. The Harvard study found that small, rural and public hospitals have fallen behind larger, private and urban operations in adopting EHR systems, further widening the digital divide.

Even with the federal stimulus money — which is just a fraction of what’s needed nationwide — access to capital for IT is a big concern for many medical providers, says Bobbie Wilbur, co-director of Social Interest Solutions, a nonprofit healthcare technology provider. “Affordability is complicated by so many factors. Some just don’t have the money. Others might not make it a priority because other needs rank higher,” Wilbur says.

Spooner says IT costs could force small, independent operations to seek partnerships or mergers with larger institutions. “Independent physician practices or hospitals may become a thing of the past,” he says.

Of course, healthcare IT won’t do any good if it isn’t used effectively, or isn’t used at all. CIOs and researchers continue to report pockets of resistance among doctors and nurses, who in turn blame kludgy computer systems and then resort to work-arounds that involve pens, paper and Post-it notes.

To some degree, this is a generational issue. More and more medical professionals, like people in other industries, have grown up with technology or are becoming more comfortable with it.

In the future, Spooner says, caregivers will have no choice but to use computers; they’ll be viewed as incompetent if they don’t. A bigger problem than getting healthcare professionals to
What Doctors and Nurses Want

Half of healthcare providers are using some form of electronic health record system; 34% have a comprehensive system and 16% have a partial system, according to a July 2010 survey by the Computing Technology Industry Association. Overall, 56% of doctors and nurses rated their EHR system as satisfactory, while 41% fell into the middle category of “partly satisfied/partly dissatisfied.”

<table>
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<tr>
<th>Top reasons healthcare providers adopt EHR systems:</th>
<th>Improvements doctors would like to see in EHR systems:</th>
<th>Most commonly used EHR software features:</th>
<th>Top reasons for not adopting EHR systems:</th>
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<tbody>
<tr>
<td>1 Better patient care</td>
<td>1 Increased speed</td>
<td>1 Charting</td>
<td>1 Upfront costs</td>
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<tr>
<td>2 Save time, improve efficiency</td>
<td>2 Easier to use, less complex</td>
<td>2 Scheduling</td>
<td>2 Ongoing operational costs</td>
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<td>3 Reduce errors or the risk of errors</td>
<td>3 Lower cost</td>
<td>3 E-prescriptions</td>
<td>3 Impact on existing workflow or processes</td>
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<td>4 Improve staff productivity</td>
<td>4 Removal of unnecessary functions</td>
<td>4 Computerized physician order entry</td>
<td>4 Training and user-adoption issues</td>
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<td>5 Greater interoperability with other systems</td>
<td>5 Medications management</td>
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<td>5 Better remote access</td>
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Base: 300 U.S. healthcare providers, including doctors, dentists, nurses, physician assistants and office managers; multiple responses allowed.

Source: Computing Technology Industry Association Survey on Healthcare IT, July 2010

Simply implementing computer systems won’t dramatically improve [healthcare] quality overnight. Very careful system design and configuration, along with a lot of thoughtful human process improvement, are necessary in order to make the technology truly helpful.

**Peter Gabriel**, Director of Informatics, The University of Pennsylvania School of Medicine’s Department of Radiation Oncology

accept technology is that there’s been too much emphasis on computers alone, and not enough focus on streamlining workflows and providing software that could help doctors make better medical decisions, according to an Institute of Medicine report released in January 2009.

Researchers who visited leading healthcare facilities found that “IT applications appear designed largely to automate tasks or business processes. They are often designed in ways that simply mimic existing paper-based forms and provide little support for the cognitive tasks of clinicians or the workflow of the people who must actually use the system.”

During the visits, researchers “repeatedly observed healthcare IT focused on individual transactions (e.g., medication X is given to the patient at 9:42 p.m., laboratory result Y is turned to the physician, and so on) and virtually no attention being paid to helping the clinician understand how the voluminous data collected could relate to the overall healthcare status of any individual patient,” the institute’s report said.

There’s been a lot of hype suggesting that the benefits of healthcare IT will show up quickly and automatically, Gabriel says. “Simply implementing computer systems won’t dramatically improve [healthcare] quality overnight,” he says. “Very careful system design and configuration, along with a lot of thoughtful human process improvement, are necessary in order to make the technology truly helpful.”

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FDA Eyes Wireless Network Regulation

Networks at clinics and hospitals could become ‘regulated medical devices’ because of data they carry. By Lucas Mearian

With an increasing number of hospitals and clinics plugging patient-monitoring equipment and other devices into traditional data networks, the U.S. Food and Drug Administration is getting closer to regulating the networks as medical devices.

Currently, most hospitals and clinics manage medical devices on discrete networks to better ensure the safety and security of those systems. But there is a trend toward consolidation, particularly onto wireless networks, for easier management.

“We’re trying to get away from separate networks and put those medical devices on the IT backbone; the problem is, that backbone has never been tested to support these medical systems,” says Rick Hampton, wireless communications manager at Partners HealthCare System in Boston.

In 2008, the FDA released its Medical Device Data System (MDDS) proposal, which is aimed at reclassifying healthcare IT systems. The proposed regulation would define a medical device as anything that provides electronic transfer, exchange, storage, retrieval, display or conversion of medical device data without altering the function or parameters of any connected device.

“If you take a thing and connect that thing to a medical device as defined by the FDA, and that thing extracts medical data as defined by the FDA, and it takes that data and transports, displays, stores or manipulates that data, then that thing is a medical device,” Hampton says.

Partners HealthCare, which includes Massachusetts General Hospital, Brigham and Women’s Hospital, and Dana-Farber/Partners CancerCare, is for now keeping its medical devices on stand-alone wireless networks, according to Hampton. But that’s frustrating for IT administrators who would rather manage all of their wireless networks as a single system for convenience. Moreover, “most IT departments look at being regulated with quite a bit of disdain. [With] a regulated medical device, you can’t make changes to those networks willy-nilly,” Hampton says.

A Standard Takes Shape

The FDA encouraged the international standards organization ISO and the International Electrotechnical Commission (IEC) to form a joint working group to draft a standard that...

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RICK HAMPTON, WIRELESS COMMUNICATIONS MANAGER, PARTNERS HEALTHCARE SYSTEM
addresses management risks associated with medical IT networks. After years of work, the IEC 80001-1 Risk Management Standard was finalized in November 2010 by both the IEC and the Association for the Advancement of Medical Instrumentation.

The standard is aimed at three key areas of risk management, says Karen Delvecchio, lead systems designer at GE Healthcare: protecting patient safety, securing patient data, and systems, and ensuring the effectiveness of patient care. “Those three things all have some risk associated with them in medical IT networks, and in fact they need to be balanced,” she says. “Often, we do things to increase effectiveness [but they] bring safety risks. Or we may increase security [at the expense of] safety risks or effectiveness.

“A lot of people have actually been looking forward to [IEC 80001-1] because it organizes how to address risk management. It organizes the roles and responsibilities,” Delvecchio adds.

For instance, the standard deals with issues such as electromagnetic compatibility between electronic devices and defines the requirements for risk management of IT networks that incorporate medical devices. However, the standard does not specify acceptable risk levels, and adherence isn’t mandatory, at least not officially. The FDA typically takes a carrot-and-stick approach to pushing standards compliance.

“You can follow joint working groups’ standards or not,” Hampton says. “If you follow them, then you get to collect money from Medicare and Medicaid. If you don’t comply, then you have two choices: You can have the federal government come in and inspect your hospital, or you can decide not to accept money from Medicare or Medicaid. Voluntary sometimes isn’t exactly voluntary.”

Add-ons in the Works

Todd Cooper, a member of the ISO and IEC joint working group, says the panel is currently preparing three follow-up documents to the new standard. Those documents, which are due out later this year, will focus on wireless networks, step-by-step risk management for healthcare organizations, and issues involving the communication of security risks and requirements.

Cooper, who has co-founded a healthcare IT consultancy called 80001 Experts to help organizations that are seeking to apply the new standard, describes the state of wireless network convergence in the industry as “a complete mess.” “In fact, some people have said wireless is one of the technologies that forced the hand of 80001-1,” he says. “With wired networks, you can always lay new cable [to] guarantee better system effectiveness. With wireless, you can’t do that. You only have so much spectrum.”

The cost of adhering to the standard could be significant. For example, hospitals will have to designate a risk management facilitator to develop processes and procedures and analyze what has or has not already been done. “The purpose of that is to expose what hidden risk has not been thought of yet,” Delvecchio says.

Hampton recognizes that before they can converge medical device and data networks, hospitals need a list of the requirements a network must fulfill in order for medical devices to work safely and effectively. And staffers need to be trained to maintain those networks.

“Now we have to know as much about our IT network as we do about our medical device network,” he says. “I’m here to tell you there’s a huge gap in information that I can get from the IT world. Most IT vendors I’ve talked with, their notion is that 80001 doesn’t affect them because they’re not a medical device manufacturer. But it’s not what you think you are; it’s what the FDA thinks you are.

“Some hospitals have either not gone forward with wireless network convergence or greatly constrained what they would have done,” Hampton continues. “Others have gone ahead with integrating medical device alarms on their wireless devices and perhaps even turned the alarms off at the bedside, which is a no-no from a regulatory standpoint.”

Case in Point

A 2002 incident at CareGroup Healthcare System in Boston shows why healthcare providers might be leery of converged networks. CareGroup lost its entire data network for four days after unmanaged physical changes went awry, but its medical devices continued to work because they used a separate, discrete network.

“Had they had a truly converged network, their medical devices wouldn’t have worked either,” Hampton says.

Delvecchio says the medical community is keenly aware of the problems and dangers associated with network convergence — including the unanticipated consequences of adding medical or communication devices to a traditional data network that did not previously support healthcare systems. For example, an operating system upgrade or a security patch could cause a clinical application to go down.

“I’ve been to meetings of biomedical engineers. If you ask them if there are any cases where IT has disrupted patient care, all their hands go up,” she says. “Sometimes it happens during the network design phase. Or it could be patient monitors, or some kind of alarming system, and when you fire it up, something else breaks.”

Karen Delvecchio, Lead Systems Designer, GE Healthcare
Deploying E-health Record Technology

STRATEGIES

Why healthcare facilities that haven’t begun EHR rollouts yet might want to wait. By Lucas Mearian

Over the next two years, 58% of small physician practices plan to roll out electronic health record systems. And by 2014, the federal government wants more than half of all healthcare facilities to use EHRs.

As of last fall, however, less than 20% of hospitals and 25% of physician practices had deployed EHR systems, and most of them would not meet the federal government’s criteria for “meaningful use” of those systems, according to Karen Bell, chairwoman of the Certification Commission for Health Information Technology (CCHIT), a nonprofit organization whose mission is to accelerate the adoption of healthcare IT systems.

Perhaps the biggest obstacles for physicians and hospitals are the magnitude of many healthcare IT projects and the need to meet those “meaningful use” requirements from the Office of the National Coordinator for Health Information Technology, which is part of the U.S. Department of Health and Human Services. To help providers overcome those obstacles, public and private financing is available for EHR rollouts. Moreover, there are cost-effective ways of deploying the technology, and it may not even be necessary to rebuild an existing IT infrastructure to accommodate an EHR system. One option is to share the data center of another local healthcare facility that has a large IT support staff.

Nonetheless, even with financing and alternative deployment strategies at their disposal, hospitals and other providers that haven’t started using EHR technology might want to wait.

“I know there are incentives out there, but the $44,000 or $65,000 you can get comes over a five-year period,” Bell says. “If you haven’t gone through the readiness process, gotten your staff ready and gotten everyone on board with what this will entail and put a project plan in place, then you’d probably do better to wait — maybe even until 2013, when a whole new set of criteria comes out.”

Timing Is Everything

By waiting, clinics or physician practices could not only meet more of the criteria for meaningful use of EHR systems, but also deploy systems that meet their own needs for patient care and administrative automation.

The Office of the National Coordinator for Health Information Technology uses the CCHIT to test and certify electronic health records. To date, the CCHIT has certified more than 300 EHR products offering varying levels of sophistication.

The CCHIT also has the authority to certify homegrown EHRs. If a hospital builds out its own infrastructure and pieces the software modules together, the organization can remotely access servers and work with administrators to offer a certification specifically for that system, Bell says.

Experts agree there’s no question that EHR technology can benefit both healthcare providers and patients. EHRs allow physicians to share test results, radiological images and other clinical information in near real time with patients and other physicians. They can also reduce administrative tasks associated with paper-based systems, and they will eventually help ensure that caregivers adhere to so-called evidence-based medicine, or the use of best practices for treatment.

At the same time, physicians who employ EHR systems will be able to more easily use wireless devices, such as tablet PCs and smartphones, at the bedside and from remote locations.

The most basic in-house EHR systems cost about $250,000, but depending on the size of the organization and the capabilities of the technology, the price tag can quickly grow into the millions for larger hospitals, according to Judy Hanover, an analyst at research firm IDC’s Health Insights unit.

Under the American Recovery and Reinvestment Act (ARRA) of 2009 —
Benefits of Certification

Most people think of software when they think of electronic health records, but the systems also require hardware, operational and technical support, broadband networks and wireless connectivity, says Karen Bell, chairwoman of the Certification Commission for Health Information Technology. A successful EHR deployment also requires staff buy-in. “Believe it or not, there are still a lot of people who are not comfortable with typing,” she says.

Dr. Tom Handler, a healthcare analyst at Gartner, says one of the greatest challenges in rolling out an EHR system is establishing what’s called clinical governance, or guidelines, for how physicians in a practice or in different departments in a hospital need to use the electronic data systems.

“How should you get the system up and running in a practice? Or, if it’s a multichain hospital, how do you roll it out to all [your] hospitals and ensure all the pieces and parts are rolled out in the right order?” Handler says. “So in some ways, it’s less about the technology and the hardware and the software and more about the culture and the governance and the management.”

The CHCIT offers two EHR certifications. The CHCIT 2011 Ambulatory Certification goes to EHR systems with state-of-the-art security features, integrated components and the most robust patient care capabilities. The ONC-ATCB certification verifies only that an EHR system is capable of helping caregivers meet the meaningful use requirements.

Systems with the ONC-ATCB certification will help physicians and hospitals get federal incentive funds, but they may not offer a full set of features for patient interaction. And it’s more than likely that those systems’ modules – for billing, patient scheduling, image archiving and other tasks – won’t talk to one another, meaning they would have to be managed through separate interfaces.

Bell recommends choosing an EHR system with dual certification, which guarantees it will be state-of-the-art for patient care, practice management and meaningful use. To date, of the 153 EHR systems that are CHCIT Certified and the 240 that are ONC-ATCB-certified, 67 have been certified under both programs.

“A certified product gives you all the functionality, interoperability [and] state-of-the-art security for patient care,” she says. “But you need to teach all your staff in the process. It can’t just be a physician decision.”

— Lucas Mearian

also known as the economic stimulus plan — physicians who implement EHR systems and demonstrate that they are engaged in meaningful use of such technologies can receive reimbursements of up to $44,000 under Medicare and up to $65,000 under Medicaid.

Physicians, hospitals and other healthcare providers that don’t roll out electronic health record systems or don’t prove that they are making meaningful use of such tools by 2015 will face penalties in the form of reductions in Medicare reimbursements.

There are three stages of meaningful use, as defined by federal officials. Doctors and hospitals now implementing EHRs do so under Stage 1 guidelines released last summer. Stage 2 and Stage 3 guidelines are set to take effect in 2013 and 2015, respectively, with the final rules coming out about a year before they go into effect.

The Stage 1 criteria focus on improving the quality, safety, efficiency and coordination of care, and on reducing health disparities. They also call for adequate privacy and security protections for patient health information.

There are about 25 Stage 1 meaningful-use objectives that must be met. Among other things, a computerized physician order entry system must be used for at least 80% of all physician orders and 10% of hospital orders, real-time electronic drug and allergy alerts must be enabled, and at least 75% of all prescriptions written by a clinician must be transmitted electronically to a pharmacy.

Choosing an EHR System

One way to defer the cost of an EHR rollout is to choose the software-as-a-service (SaaS) option, where a vendor runs the applications in its own data center while offering caregivers the EHR functionality over secure networks.

Dr. Tom Handler, a radiologist who’s now a healthcare analyst at research firm Gartner, says physicians and hospitals need to have a clear understanding of what they’re buying if they go the SaaS route.

Most vendors that say they have SaaS offerings actually sell hosted services. The difference? In the SaaS model, software resides on servers in a vendor’s data center that is shared by multiple customers. It’s most often not customizable, but rather a one-size-fits-all product. In a hosted service model, the vendor sets up a physical infrastructure with customized services for your environment.

Of the major enterprise-class EHR vendors that Gartner covers in its research, including Allscripts Healthcare Solutions, Cerner, Epic Systems, GE Healthcare, McKesson, MediTech and Siemens, none uses a true SaaS model. All offer hosted services.

Other EHR SaaS vendors include eClinicalWorks, Ingenix, AthenaHealth, Greenway and NextGen Healthcare.

Typically, providers that choose a SaaS-based EHR system pay an upfront start-up charge followed by a per-physician monthly subscription fee. According to Handler, a good rule of thumb is that an organization shouldn’t pay more than $500 per physician for a hosted EHR system. And depending on how badly a vendor wants your business, you could end up paying much less.

“The larger vendors offer more in terms of financing options than others,” says IDC’s Hanover.

For example, GE Healthcare can leverage its $50 billion sister division, GE Capital, to offer financing packages. A smaller vendor, such as Greenway Medical Technologies, might be able to offer more personalized service, but it uses a third-party leasing partner for its financing.

Jim Corrigan, vice president and general manager of GE Healthcare IT, says his company charges on a per-physician basis, with the fee varying depending on the terms of the
service-level agreement, which covers things such as practice management, connectivity to labs, insurance payments and billing systems. The bottom line is that GE Healthcare IT charges $3,000 and $6,000 per doctor upfront and ongoing subscription fees of $300 and $600 per physician per month.

“We’re also going to experiment on our SaaS model by upping the monthly fee and reducing the upfront fee,” Corrigan says. Like other large EHR vendors, GE Healthcare also offers a number of financing programs, such as a zero-down, zero-payments-until-2012 option. The benefit of that financing option, which GE calls the Stimulus Simplicity plan, is that a clinic can deploy an EHR now and then get qualified for meaningful use reimbursements before paying out of pocket.

**Alternatives to Vendor SaaS**

While the SaaS model is attractive because it offers lower start-up, operational and maintenance costs, it does often involve vendor lock-in.

“There’s no portability to [a SaaS-based EHR system],” says Bell. “If a company goes out of business, or if you decide to move your records from one EHR and go to another, there most likely will be issues with getting the data out of where it’s residing and moving it to somewhere else.” Bell also points out that there are hidden upfront costs at the hidden upfront costs. Many users forget to consider with a SaaS EHR setup, such as the costs of installing the proper networks and ensuring that the new software will work with your existing practice management system.

“These are all things that have to be considered,” she says. For Columbia Memorial Hospital in Hudson, N.Y., unexpected costs came from the need to upgrade remote physician practices from Windows 2000 to Windows XP servers, and get wireless and broadband networks installed. The hospital is located in a rural area, so getting adequate bandwidth is difficult. Most of the remote clinics were running fractional T1 lines or DSL virtual private networks with 1.5KB/sec. download and 512KB/sec. upload speeds. The hospital needed 768KB/sec. bidirectional capacity to handle the additional data traffic that comes with an EHR system.

At one clinic with four physician practices, the hospital

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**Sharing the Load**

Some regional hospitals with large IT shops have opted to build out their data center infrastructures in order to offer hosted EHR services to smaller hospitals and healthcare providers in their areas. As IDC analyst Judy Hanover points out, “It often is not a core competency for hospitals and physician practices,” and small clinics aren’t likely to be able to keep good IT personnel around for long.

The system at University of Pittsburgh Medical Center is a good example of a large healthcare facility offering shared EHR services. UPMC is an $8 billion integrated global health enterprise, and it’s one of the leading nonprofit health systems in the country.

For all intents and purposes, UPMC runs a private cloud. All healthcare, financial and administrative applications run in a shared environment.

Paul Sikora, vice president of IT at UPMC, says his hospital shares its data center with 27 other hospitals in the region, including Children’s Hospital of Pittsburgh, which opted to run its EHR applications on discrete servers in UPMC’s facility.

In 2009, the Healthcare Information and Management Systems Society honored Children’s Hospital with its HIMSS Analytics Stage 7 award in recognition of the fact that the hospital had an advanced patient record environment. “One reason they were able to do it is they didn’t have to worry about infrastructure,” Sikora says.

UPMC began to rip and replace its outdated data center infrastructure five years ago at a cost of millions of dollars — and it was worth every penny, says Sikora. An IDC evaluation of UPMC showed that the hospital avoided $80 million in expenditures that it would have incurred if it had stuck with its previous infrastructure, he says.

Apart from that $80 million in cost savings, Sikora says he was also able to avoid the need to build a new $85 million data center to keep up with server sprawl.

“A lot of that savings was because of the virtualization we rolled out,” he says. “When you can pack 24 rows of servers into one server rack, that’s savings. When you cut 100 Unix servers down to 14, that’s savings.” UPMC runs its new virtualized environment at one-fifth the cost of its previous data center, he adds.

The medical center has 1,300 Windows virtual machines on 22 physical servers, allowing it to add capacity for client hospitals in hours by tapping on a keyboard instead of building out additional infrastructure. And I/O loads are matched with the most cost-effective computer service in the environment.

UPMC not only virtualized its servers with VMware; it also virtualized its storage with IBM’s SAN Volume Controller appliance, which sits in front of storage arrays and makes them appear to application servers as a single pool of available capacity.

“When you get all of your enterprise systems in a standardized environment, you can start to manage it differently. You start to see load characteristics, and then you can determine that you can take this data and put it on Tier 3 storage with a lower cost,” Sikora says.

UPMC, which has an IT staff of 197 people who support 4,000 physicians, began its data center consolidation and upgrade in 2005, long before the government began formulating its requirements for meaningful EHR use. Sikora says the technical complexity behind EHR systems just from an infrastructure standpoint is “enormous.” A midsize hospital starting up an EHR project could devote more than half its effort just to getting the new infrastructure operational, “and that hinders the ability to do the task at hand, which is the health record itself,” he says.

“What we do is very scalable. Any number of community hospitals could share in an environment like ours,” Sikora says. “I think if the government were to fund some type of regional data centers, it’s probably money better spent than giving hospitals money to figure out how to do it.”

— LUCAS MEARIAN
was forced to run a 10Gbit/sec. fiber optic line. The project required the use of “several carriers,” says Michael LaForge, Columbia Memorial’s network administrator.

LaForge says his hospital considered using a SaaS offering, but the board decided it wanted control over the information, hardware and software. Having control can be costly, though. Without putting an exact price on the project, LaForge says it costs millions of dollars.

“I think in the end, we were a little surprised what the costs were. Not only was it expensive to get in, but then you have the ongoing costs. You figure in 26 practices and remote sites, and it adds up fast,” he says.

LaForge says hospitals not only have to figure in monthly license fees; they also have to pay for maintenance and support for things like tablet PCs, laptops, smartphones, scanners and even fax lines, which some physicians insisted on even though they could fax documents electronically.

Columbia Memorial’s CIO, Cathy Crowley, was able to secure a significant amount of state grant money to help defray the cost of the EHR rollout by offering to share the hospital’s data center with physician practices that aren’t affiliated with Columbia Memorial.

Under the HEAL NY (Health Care Efficiency and Affordability Law for New Yorkers) grant program, the 190-bed hospital was able to afford a virtualized cloud computing network that serves 200 clinicians at 26 clinics, laboratories and group practices in the Hudson River Valley.

The hospital set an aggressive six-month timetable for implementing the EHR system because it had to meet grant deadlines. “Normally, I’d advise you to spread it out some, because we didn’t have time to learn from one or two implementations before we moved on to the next one,” Crowley says.

To save money and avoid server sprawl while managing systems centrally, the hospital went with a VMware virtualized server environment. It also chose Stratus Medical Grade ftServer and ftScalable Storage for the core of the cloud infrastructure to provide the required uptime to serve the various physician practices.

“Had we not done server virtualization and some other things, our costs would have been higher, but even so, it was higher than we’d projected,” Crowley says.

“It’s one thing when I can send out an email in our hospital saying we’re going to be down for maintenance today, but now we’re answering to all these other clinics,” LaForge adds. “We had to look at ourselves as a SaaS provider. The hardware fault tolerance of the Stratus equipment combined with VMware gave the kind of uptime we felt we needed to provide.”

The hospital has four virtualized servers and one server for vCenter, which cost several hundred thousand dollars in hardware alone.

Crowley and LaForge are still working on integrating the hospital’s laboratory and radiology departments with the EHR system, but the technology has been available to the rest of the hospital and to affiliated and nonaffiliated physician practices since last May. Nonaffiliated practices have their own discrete database instances, but all of them pay the hospital for the service based on a chargeback model.

“From that perspective, it’s a SaaS model to them,” says LaForge.

Crucial First Steps

In order to justify the cost of an in-house, client/server EHR model, healthcare providers should tackle EHR projects in groups of three or more, according to Bell.

IDC’s Hanover recommends that before rolling out an EHR system, physicians and clinics should first perform a gap analysis to determine what they currently have and what they still need in order to roll out the new system. They should consider what technology will be required to support their service goals, and they should take into account both near-term and long-term meaningful-use requirements, as well as their patient care goals. Only after doing all of that should they put together a request for proposals for vendors.

Gartner’s Handler suggests that healthcare providers should also consider processes and protocols — in other words, they should figure out how to standardize technology rollouts from physician practice to physician practice and hospital to hospital in a group. Also, they should consider whether they need functions such as order sets as part of a computerized physician order entry system with pre-filled ordering templates.

The Office of the National Coordinator has established 79 Regional Extension Centers, or RECs, throughout the U.S. for the explicit purpose of helping physician practices and rural clinics roll out EHRs.

RECs were created in 2009 under the Health Information Technology Economic and Clinical Health (HITECH) Act. For the most part, the RECs don’t offer healthcare providers any funds, but they do provide training and technical assistance in rolling out computer systems. Each REC has 10 to 30 employees, depending on the size of the region in which it operates.

The U.S. government also issued $14.4 million in grants to create college courses to train people and help fill an estimated 50,000 jobs needed to assist doctors and hospitals as they roll out EHRs. However, none of that money covers the cost of EHR hardware and software — the most basic costs associated with health IT.

Another Reason to Wait

Bell says physician practices and clinics that haven’t begun implementing EHRs may get a system that truly suits their needs — and meets federal meaningful use criteria — later on.

By waiting until 2012 or 2013, healthcare facilities can ensure that they are preparing to meet both Stage 1 and Stage 2 meaningful use requirements.

“The very first step that needs to happen, which frankly many physician offices skip, is the business plan. Why are you doing this? Be very clear about your revenue stream now, your revenue stream after you adopt,” Bell says. “Ask if this is the time to go forward with an EHR, or should you watch and wait a little more?”

If you ask Crowley, however, there are worthwhile benefits to implementing an EHR system long before the government’s deadline.

“We’re definitely pleased we did it, and we can see the light at the end of the tunnel. I think we’ll be ecstatic once a whole year goes by and everybody’s much more comfortable with it,” she says. “In terms of patient safety, we’ve taken a huge leap forward.”
Targeted alerts in electronic medical systems can help physicians pay closer attention to the messages they receive and greatly reduce unnecessary tests that yield false positives, according to a study published last November.

The study, conducted by managed care organization Kaiser Permanente, involved a randomized trial of 788,000 patients at eight clinics. It found that an electronic alert sent to physicians the moment they ordered a certain blood test for elderly patients reduced unnecessary use of the test. The alert was simple: It told physicians that the test, which often produces false positives for the elderly, isn’t reliable for that age group.

The study was among the first to look at the effectiveness of sending electronic alerts for a specific condition affecting a distinct patient population.

Electronic medical alerts, or electronic messages, come standard with electronic medical record (EMR) software. But alerts can overwhelm physicians, who then ignore them in much the same way that people quickly dismiss pop-up advertisements online. As hospitals install IT systems and software, new layers of automated messages are often added to older systems that already provided alerts.

For example, hospitals’ earlier pharmacy electronic order-entry systems likely came with drug allergy alert systems. Those tools are often replicated in today’s EMR software.

While early systems typically had several hundred alerts that could be deactivated manually, newer technologies can deliver thousands of alerts for nonspecific conditions.

The more those alerts can be targeted, the less likely they are to be ignored, according to Dr. Ted Palen, a clinician researcher at Kaiser Permanente’s Institute for Health Research in Denver and the study’s lead author. “What we’ve seen in electronic medical records is [that] the provider many times clicks through alerts and just wants to get rid of them.”

Kaiser Permanente’s study focused on a blood test called the D-dimer, which is used to detect clots. In reality, the test detects only chronic inflammation, an indicator that a patient may have a clot and therefore should undergo further testing. While the D-dimer test is very effective in spotting the possibility of clots in younger people, the older a patient is, the more likely he is to suffer from chronic inflammatory conditions, such as arthritis, which can trigger false positives.

“The issue is that if you’re ordering a test that doesn’t give you good information, why order it?” Palen says. “We didn’t embark on this to show how we can save on testing costs. We want to advise clinicians how to follow good evidence-based medicine guidelines.”

Evidence-based medicine involves best practices that use evidence gained from the scientific method for medical decision-making. One of the main reasons the federal government is pushing the rollout of EMR software in healthcare facilities is to promote the use of evidence-based medicine. Instead of giving the D-dimer test for clots, physicians who suspect that an elderly patient may have a blood clot could instead order an ultrasound or a CT scan.

An advantage of the D-dimer blood test is that it is relatively inexpensive, about $35. However, it can take up to two hours to get the results of a D-dimer test, potentially affecting treatment of patients who need immediate care, Palen says.

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“What we wanted to see is if we targeted an alert to a specific condition, i.e., blood clots, for a specific group of a patients, i.e., older patients, can it change physician behavior?” he explains. “The other message of this study is, how best do we engineer or configure our electronic medical system to give the alert at the right point in time and deliver the right message? We saw we could influence physician behavior and have it remain consistent over time.”