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/ FEATURES

Jim Scheulen, Johns Hopkins Medicine

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INSIDE/DEPARTMENTS

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editor's NOTE

Using data to achieve efficiency

AS A YOUNG BOY, I COLLECTED baseball cards. The back of each card contained rows and columns of the player's career performance data—for hitters, you'd find each year's number of home runs, hits and runs batted in, for example. For pitchers, you'd see strikeouts, walks, earned run averages and win-loss records.

But that data no longer is enough to track player performance. A whole new world of statistics—sabermetrics—now surrounds player assessment. Batter performance is measured by on-base plus slugging, weighted on-base average or slugging percentage. Pitchers are rated by WHIP (walks plus hits per inning pitched) and OOPS (that's opponent on-base plus slugging, not what you say after an opposing batter hits a grand slam). Computers, and the data they can crunch, are grist for the mill for analysis and improvement efforts in baseball and most other sports.

Similarly, healthcare providers now are in a better position to take advantage of the wide range of healthcare information they collect during day-to-day operations. The data they cull from their information systems can prove invaluable in helping them boost their organizations' operational efficiency and improve patient care.

Hospitals, by themselves, are incredibly complex to operate, with myriad moving pieces that must be exquisitely coordinated to provide seamless service to patients. Departments as diverse as radiology, patient transport, food service, nursing, spiritual care, pharmacy, housekeeping and clinical services all must be coordinated so patients get the care they need when they need it. Missteps can result in dissatisfied patients or far worse—mistakes, delays or neglect that lead to medical complications or death.

Managing Editor Greg Slabodkin highlights in his cover story, which begins on Page 20, the future of healthcare for most organizations, showcasing command centers that are being used at facilities such as Johns Hopkins Hospital and New York-Presbyterian Hospital. The aim is to bring together different streams of information from separate IT systems and provide a forum for coordinating operations. Johns Hopkins has a NASA-style command center for optimizing care coordination, improving the patient experience and enhancing efficiency as a byproduct.

Data flowing in from information systems also is crucial to healthcare organizations looking to improve their performance in the population health management arena, writes Contributing Editor Linda Wilson in her article on Page 30. As part of population health initiatives, providers are using IT to better enable them to segment patients into cohorts and defining care processes tailored to each group.

Not that struggles have been eliminated—despite a wealth of data from information systems, healthcare organizations are still scrambling to find ways to achieve price transparency, reports Maggie Van Dyke in her feature beginning on Page 64. The variety of payer contracts makes it difficult for providers to preemptively quote prices for services to patients, she writes.

Fred Bazzoli

Fred Bazzoli
Editor

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DATA SHARING

Interoperability Groups Link Up

Carequality, CommonWell to work together to move information over each other's systems

Two industry organizations, Carequality and CommonWell Health Alliance, both working toward greater interoperability of health information, have agreed to a formal collaboration.

Carequality is a coalition of stakeholders working on interoperability issues via a consensus-driven process. Carequality operates under the umbrella of The Sequoia Project, which runs eHealth Exchange, a national health information network. CommonWell Health Alliance is a trade association of health information technology companies cooperating to create improved access to health data. The organization represents two-thirds of the acute care electronic health records market and more than a third of the ambulatory EHR market. Together, the organizations cover 90 percent of hospitals and 60 percent of physicians.

Right now, if a provider uses EHR and health information exchange technology from a vendor aligned with CommonWell, the exchange of data can be sent only to other vendor members of CommonWell, and it's the same with Carequality. As a result of the new collaboration, providers using CommonWell services will be able to exchange data with providers using Carequality, and vice versa, says Jitin Asnaani, executive director of CommonWell.

Asnaani describes the impact of the arrangement as similar to that of other data networks, such as the wireless telecommunication network, which connects people and organizations using any of the systems of individual service providers. Now, both CommonWell and Carequality will have the capability to connect hospitals and clinics to other care providers that are not in the same network.

"We have parallel paths that have now grown together," says Mariann Yeager, CEO of The Sequoia Project.

CommonWell and Carequality communicated with each other as both went through their formative states, and now both entities are mature, which provides the impetus for the new alignment.

The organizations have been working on the collaboration for the past year, increasingly being prodded by demands from their respective end-user providers for more data-sharing opportunities.

—Joseph Goedert

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Newsline

TECH

FDA, IBM Watson Health to Study Application of Blockchain Technology

The Food and Drug Administration and IBM Watson Health are forming a partnership to investigate potential ways that blockchain technology can be used in healthcare. The agency and IBM subsidiary have signed a two-year agreement that will enable them to jointly explore ways to use the emerging technology. Initial efforts will focus on oncology-related data.

Proponents of blockchain technology believe it could have wide applicability in healthcare. It enables the collection of data from a variety of sources, and keeps an audit trail of transactions, thus establishing accountability and transparency in the data exchange process.

The FDA and IBM Watson Health will look at ways blockchain technology can enable healthcare entities to work together with more trust. They believe the technology can support the exchange of "owner-mediated data from several sources," such as EHRs, clinical trials, genomic data and information gathered from currently untapped sources, such as mobile devices, wearables and Internet of Things devices. Initial efforts will focus on how a blockchain framework can assist public health efforts.

"One aspect of the FDA's role as a regulatory science agency is to conduct research that informs the development of new tools, standards and approaches to assess the safety, efficacy, quality and performance of all FDA-regulated products," said Sean Khozin, MD, senior medical officer, Office of Hematology and Oncology Products at the FDA's Center for Drug Evaluation and Research. "By studying blockchain technology, the FDA is contributing to the advancement of clinical research by testing novel frameworks for secure exchange of valuable patient-level health data at scale."

It's this wider view of patient information that will assist researchers in improving research initiatives, said Shahram Ebadollahi, vice president for innovations and chief science officer for IBM Watson Health.

—*Fred Bazzoli*

INFO EXCHANGE

3 Midwest Information Exchanges Begin Sharing Patient Data

Three health information exchanges in the Midwest are exchanging patient data in a significant step forward to develop and test a Patient Centered Data Home that could serve as a model for exchanging data between HIEs nationwide.

The initiative is part of a larger pilot funded by the ONC to improve interoperability between HIEs. It's the third and largest pilot for the Strategic HIE Collaborative, a national trade association for HIEs that is acting as project lead. Organizers believe the approach can eventually tie together the 48 HIEs that are SHIEC members.

The Indiana Health Information Exchange (IHIE), Michiana Health Information Network (MHIN) and East Tennessee Health Information Network (etHIN) reached an agreement to enable data-sharing among their HIEs, ensuring that a patient's healthcare record follows them wherever they seek care.

Those HIEs, and four others, are part of the PCDH Heartland initiative. The goal is for all seven to eventually share patient data, enabling providers using those exchanges to access that information.

"This is an exciting first step toward a much larger goal," said John Kan-

sky, president and CEO of IHIE, which is based in Indianapolis. "At the completion of this pilot, we'll be exchanging health information among seven HIEs and across five states."

Other Heartland partners include Great Lakes Health Connect (Grand Rapids, Mich.), HealthLinc (Bloomington, Ind.), Kentucky Health Information Exchange (Frankfort)and The Health Collaborative (Cincinnati).

All SHIEC's PCDH pilots, including the Heartland initiative, use a standards-based approach to ensure the PCDH is cost-effective, scalable and ultimately benefits the patient.

—*F.B.*

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Newsline

As Hackers Try to Cash In, Ransomware Attacks Likely to Soar

HIT Venture Funding Rises

2016 was a record-setting year for venture capital funding for health IT companies, with investment exceeding $5 billion for the first time, according to research firm Mercom Capital Group. In particular, mobile health as a technology category set a new record, with $2.1 billion in VC funding. Overall, last year saw 622 deals worth $5.1 billion in investments, representing 9 percent in year-over-year growth compared with 574 deals that raised $4.6 billion in 2015. "It was a pretty good year—compared to 2015 investment grew about 9 percent, which is not bad, and it hit $5 billion for the first time," says Mercom CEO Raj Prabhu.

Hospitals, skilled nursing facilities, ambulatory surgical centers, MRI/CT scan facilities, diagnostic laboratories, urology centers, physical therapists and physician practices all had one thing in common this past year: They were hit by cyber attacks.

Hackers won't be stopping any time soon, so providers will continue to face a growing number of security challenges, particularly ransomware attacks. No one is safe, says TrapX, a vendor of software to disrupt cyber attacks, in a new report.

"Two key trends have emerged with absolute clarity in 2016; the continual discovery and evolution of medical device hijack (Medjack and Medjack.2) and the escalation of ransomware across a broad mix of targets," according to the firm.

Most providers at least install antivirus software and a firewall, so most of their infrastructure is secured, says Anthony James, chief marketing officer at TrapX. But Medjack was created to attack medical devices, which often run on old versions of Microsoft Windows, so applicable patches may not be available.

Consequently, medical devices, including infusion pumps, heart-lung machines, ventilators, extracorporeal membrane oxygenation machines, dialysis machines, blood gas analyzers, CT scanners, PACS, and portable C-arm X-ray machines, have become a major open door to Medjack devices. When TrapX representatives visit a hospital, they almost always find Medjack or other malware on specialized medical equipment.

Attackers go after these devices because "they are a vulnerable target to use to launch data theft or ransomware," James explains. "They are just a starting point."

Most of the attacks can be stopped by a second-generation perimeter and second-generation endpoint defenses, but most hospitals don't have this technology, he adds. —*J.G.*

Radiology Justification Criteria for Imaging Orders to Impact EHRs

Much uncertainty and little industry awareness surround a new program that will require physicians ordering outpatient radiological procedures for Medicare beneficiaries to justify ahead of time that the imaging is necessary.

The reimbursement approach aims to have physicians refer to industry-developed appropriateness criteria before ordering advanced—and expensive—imaging procedures for patients, using clinical decision support modules that will be tied into organizations' EHRs.

The program, one of the provisions of the Protecting Access to Medicare Act of 2014, will go into effect Jan. 1, 2018, but many specifics of how it will work are still in development.

The use of criteria is expected to be applied to imaging studies ordered for outpatients for eight types of studies, termed priority clinical areas—coronary artery disease, suspected pulmonary embolism, headache, hip pain, low back pain, shoulder pain, cancer of the lung, and cervical or neck pain, says Joseph Hutter, MD, a lieutenant commander in the U.S. Public Health Service.

The program will have significant effects on ordering physicians, radiological professionals and healthcare organizations, which will need to add imaging-specific modules to their EHR systems and adjust workflows. In addition, it could impact payments for radiology professionals in 2018 and force a small percentage of physicians who regularly override appropriateness criteria to seek preauthorization for studies beginning in 2020.

Criteria to justify advanced radiological procedures for those clinical reasons have been hammered out by professional organizations, presenters say. Before physicians order tests, they'll need to use a clinical decision support module, expected to be embedded in their EHR systems.

—*Fred Bazzoli*

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171K Docs Face MU Pay Reductions

About 171,000 Medicare-eligible professionals will be facing a 3 percent payment reduction in 2017 under the Medicare Electronic Health Record Incentive Program for failing to demonstrate meaningful use in 2015. That's the official number provided by CMS. An EP that did not successfully demonstrate MU for an applicable EHR reporting period in 2015 will receive a reduction in Medicare Physician Fee Schedule payments for covered professional services in calendar year 2017, CMS noted that 171,000 EPs negatively affected in 2017 is down significantly from the 257,000 and 209,000 penalized in 2015 and 2016, respectively.

VA Eyes Digital Health Platform

The Department of Veterans Affairs has developed a blueprint for a cloud-based technology platform that will integrate veteran data from VA, military and commercial electronic health records, as well as apps, devices and wearables, so the information is available to providers in real time.

While the VA is still finalizing plans for how it will implement the Digital Health Platform (DHP), the agency has a strategy in place that is seen as the future path for providing next-generation healthcare to millions of the nation's veterans.

According to LaVerne Council, the VA's CIO and assistant secretary for information and technology, DHP is meant to provide a comprehensive dashboard covering a veteran's complete medical record, enabling a holistic approach to healthcare that supports patient-centric care and stresses customer relationship management.

"It moves beyond just the normal looking at an electronic health record and provides so much more than the EHR's static point of view," says Council, who oversees the VA's $4 billion IT budget and more than 8,000 IT employees. "In order to provide great healthcare, we have to have analytics. We have to understand our responsiveness. We need to understand the environment. And, we need to be able to engage veterans in a way that is seamless, easy for them, and at the same time ensures that we are addressing their needs."

The whole concept around the DHP is that "you never see the system, the system just knows you," she adds.

Council notes that the DHP uses open-source standards such as HL7's Fast Healthcare Interoperability Resources (FHIR) API to integrate the more than 130 instances or versions of the VA's legacy EHR system—the Veterans Health Information Systems and Technology Architecture (VistA)—as well as military and commercial EHRs.

—Gregory Slabodkin

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FDA Issues Guidance to Secure Med Devices

THE FOOD AND DRUG ADMINISTRATION HAS released final guidance on the postmarket management of cybersecurity in medical devices. Of particular concern is the growing number of networked medical devices, the vulnerabilities of which could potentially put patient safety at risk.

"Networked medical devices, like other networked computer systems, incorporate software that may be vulnerable to cybersecurity threats," states the FDA's guidance. "The exploitation of vulnerabilities may represent a risk to health and typically requires continual maintenance throughout the product life cycle to assure an adequate degree of protection against such exploits. Proactively addressing cybersecurity risks in medical devices reduces the overall risk to health."

In a December 27 blog, Suzanne Schwartz, MD, associate director for science and strategic partnerships at the FDA's Center for Devices and Radiological Health, emphasizes that manufacturers must consider cybersecurity throughout the product lifecycle of devices, building in cybersecurity controls when they design and develop devices as well as continuously monitoring and addressing cybersecurity concerns after devices are on the market.

"In today's world of medical devices that are connected to a hospital's network or even a patient's own Internet service at home, we see significant technological advances in patient care and, at the same time, an increase in the risk of cybersecurity breaches that could affect a device's performance and functionality," contends Schwartz.

According to Schwartz, the FDA's guidance "recognizes today's reality—cybersecurity threats are real, ever-present, and continuously changing." Hospital networks in particular "experience constant attempts of intrusion and attack, which can pose a threat to patient safety," she notes, and "as hackers become more sophisticated, these cybersecurity risks will evolve."

Last year, the FDA alerted users of a computerized infusion pump—which communicates with hospital information systems via a wired or wireless connection over facility network infrastructures—that the device had serious cybersecurity vulnerabilities that could put patient safety at risk. As a result, the regulatory agency advised healthcare facilities to disconnect the pumps from their networks to reduce the risk of unauthorized system access.

—Gregory Slabodkin

AHA Asks Trump to Cancel MU3

The American Hospital Association has asked President Donald Trump and his emerging administration to cancel Stage 3 of the meaningful use program. In a letter, AHA asked Trump to cancel the final MU stage "so that hospitals will not be forced to spend large sums of money upgrading their electronic health records solely for the purpose of meeting regulatory requirements." Currently, the mandatory start of Stage 3 is 2018, as established by CMS in a final rule released last fall. A CMS spokesman said the agency has been responsive to stakeholder requests for flexibility in the EHR incentive program.

ONC Prepares to Check on Certified HIT

THE OFFICE OF THE NATIONAL COORDINATOR for Health IT is aiming to allay provider concerns about the performance of some EHRs in the field that do not match the stated performance they achieved during certification, according to ONC officials.

The clarification came earlier this month during a joint meeting of the HIT Policy and Standards committee during discussion of a final rule released in late October expanding ONC's scope of review.

"We recognize that certified health IT not only has to do what it's supposed to do and what it's certified to do in the testing environment, but also really has to support the needs of providers once it's on the ground," said Elise Sweeney Anthony, director of ONC's Office of Policy.

According to Sweeney Anthony, the so-called Enhanced Oversight and Accountability Rule has codified modifications and new requirements under the ONC Health IT Certification Program in an effort to better

protect public health and safety as well as strengthen the accountability and transparency of certified HIT. The provisions of the rule went into effect December 19.

"This rule is a continued commitment by ONC to make sure that the process associated with certified health IT and its use, once it's on the ground, is very transparent—that providers and other users are aware of how the technology is supposed to operate and that this actually is how it operates once it's out, released and then implemented," she added.

Sweeney Anthony said the final rule is designed to:
- Establish a regulatory framework for ONC to directly review already certified health IT products.
- Increase ONC oversight of health IT testing bodies.
- Enhance transparency and accountability by making identifiable surveillance results of certified health IT publicly available.

—G.S.

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HEALTHCARE

New control centers help providers better manage care.

By Greg Slabodkin

As hospitals continue to wrestle with operational inefficiencies that negatively impact their bottom lines, they are turning to more expansive applications of information technology to improve the way they do business.

A few leading organizations are turning to centralized command centers to improve patient flow, reduce costs and increase the overall quality of care, helping executives get the information they need, all in one place, to deal with the complexity of modern-day care delivery

Command centers are emerging as a solution for inefficient hospital operations. Proponents say they can help reduce patient wait times, increase capacity and boost revenue. Once the exclusive domain of other industries, these centers filled with monitors displaying real-time data and staffed by personnel hunched over workstations, are no longer just reserved for war rooms at the Pentagon or space operations facilities at NASA.

Some pioneers have command centers up and running, such as Johns Hopkins Hospital and New York-Presbyterian Hospital, while an increasing number of facilities are considering options for implementing a center. Each center is unique, designed to achieve some specific purpose for the organization.

Synchronizing care

Johns Hopkins' state-of-the-art command center is a model for how healthcare organizations can increase their efficiency in managing patient care.

The 2,550-square-foot Capacity Command Center combines the latest in systems engineering, predictive analytics and situational awareness to better man-

"You have to look at how all the processes come together to form this complex flow through the institution," says Jim Scheulen, chief administrative officer for emergency medicine and capacity management at Johns Hopkins Medicine.

age patient care and safety, as well as the movement of patients in and out of the Johns Hopkins School of Medicine's teaching hospital.

"We realized that we, like most hospitals in the future, are going to have to be very efficient and carefully manage the flow of patients into and through our hospital," says Jim Scheulen, who directs the center as chief administrative officer for emergency medicine and capacity management at Johns Hopkins Medicine, the parent organization.

According to Scheulen, healthcare organizations need to think about operations from a different perspective by leveraging principles of systems engineering more commonly utilized in other industries.

At the same time, he acknowledges that managing an academic medical center like Johns Hopkins Hospital is an incredibly complex undertaking in which all the pieces of the system have to work together in perfect synchronization.

"We use some of the same tools and approaches industries like aerospace, automobile manufacturing and others use—specifically, systems engineering," says Scheulen. "Instead of just trying to manage and improve individual processes, you really have to look at how all the processes come together to form this complex flow through the institution."

The example of others

Systems engineering, widely used in manufacturing and aviation, is an interdisciplinary approach to analyze, design, manage and measure a complex system in order to improve its efficiency, reliability, productivity, quality and safety.

A presidential advisory group of leading scientists and engineers recommended in May 2014 to the Obama administration that greater use of systems engineering principles could transform the U.S. healthcare system.

"It has often produced dramatically positive results in the small number of healthcare organizations that have incor-

"We use some of the same tools industries like aerospace use."

—Jim Schuelen

porated it into their processes," found the President's Council of Advisors on Science and Technology. "But, in spite of excellent examples, systems methods and tools are not yet used on a widespread basis in U.S. healthcare."

According to the report, the major barrier to greater use of systems methods and tools in healthcare is the traditional fee-for-service payment system, which serves as a disincentive to more efficient care and rewards volume, not quality of care, as well as a lack of staff training on systems engineering principles.

"Most clinicians were not trained in using systems engineering approaches, and many clinicians may not even recognize that systems methods and tools could be helpful for improving care," it concludes.

Scheulen says Johns Hopkins has adopted principles of systems engineering into its healthcare model. "The command center is really just a piece of a bigger initiative in which we're trying to use all the tools of systems engineering to manage the complex flow through the hospital," he notes.

For its part, Johns Hopkins' Capacity Command Center, staffed by more than 20 personnel drawn from different existing departments at the hospital, manages the flow of patients—from admission to discharge—from one centralized location. On average, the center receives about 500 messages per minute from 14 different Johns Hopkins IT systems generating real-time data—which is refreshed every 30 seconds—about everything from bed availability and operating room efficiency to patient status and staffing. "The purpose is to provoke action," according to Scheulen.

Previously, the hospital used phone calls, emails, faxes and texts to communicate bed availability among disparate de-

partments that were physically dispersed. Now, armed with information from multiple systems across the hospital displayed on the command center's 22 monitors, the staff is able to take immediate action to prevent or resolve bottlenecks, reduce patient wait time, coordinate services and reduce risk.

Come together

"The idea was to colocate our resources and bring everybody together who are managing the operations on a daily basis and to give them as much actionable information as possible," says Scheulen. "The data is aggregated and then is displayed on 22 screens that are in front of all of the people who manage the flow of patients."

When it comes to predictive analytics, the command center is able to forecast future demand for patient beds. According to Scheulen, the software enables the hospital to "look two days into the future for what the occupancy of every floor is going to be" and the "specific expected number of patients coming in and going out on a daily basis for the next three days."

Designed and built with GE Healthcare Partners, the command center has been in operation for about a year and has already generated significant results in terms of improved patient experience and operational outcomes.

For example, Johns Hopkins reports a 60 percent improvement in its ability to accept patients with complex medical conditions from other hospitals around the country, compared with its ability to take in those transfers before the command center went into operation. In addition, ambulance dispatches have been improved—the facility's critical care team is dispatched about 63 minutes sooner, on

average, to pick up patients being transferred from other hospitals.

Within the hospital, a patient is assigned a bed in Johns Hopkins' emergency department 30 percent faster, after emergency clinicians make a decision to admit a patient. In addition, patients also are transferred 26 percent faster after they are assigned a bed. And after surgical procedures, transfer delays from the operating room after a procedure have been reduced by 70 percent.

Finally, the impact on patient discharges has been noticeable. Some 21 percent more patients are now discharged before noon, compared with last year, before the command center opened.

To meet incoming patient demand, the command center helps to prioritize which patients should be discharged and alerts the hospital's environmental services team which beds should be cleaned first to accommodate those who will be admitted.

Jeff Terry, managing partner of GE Healthcare Partners, notes that since the Johns Hopkins command center opened last year, health systems from across the United States and around the globe have visited the facility to observe its capabilities firsthand.

"What's special about Johns Hopkins is that it has a NASA-style command center for optimizing enterprise-level patient care coordination and is the first of its kind

in the world," says Terry. "It's a patient experience program that also delivers a lot of institutional efficiency."

"I'm not going to pretend to tell you that we're perfect at it yet," says Scheulen. "The data is there and we're learning more and more every day. We've made great progress but we also know that we can do more. And that's pretty exciting."

Facilitating patient flow

Similarly, New York-Presbyterian Hospital has implemented two Patient Placement Operations Centers (PPOCs)—one at its Columbia University Medical Center campus and the other at its Weill Cornell Medical Center campus. Both PPOCs went on-

line last year and, at any given time, they have four or five patient flow specialists in the centers per shift, as well as emergency department services and patient transport supervisors.

Holly Meisner, vice president of patient access at New York-Presbyterian Hospital, describes her organization's centers as the equivalent of "air traffic control looking at the planes coming in" and effectively serving as "centralized locations with a standardized process for how we bring the patients in and we flow our patients throughout the system."

According to Meisner, the personnel staffing the PPOCs receive real-time data and are able to quickly respond to create notifications enterprisewide that better manage patient intake, bed placement and ultimately patient discharge. Meisner notes that ambulance diversion, when incoming ambulances are directed to other facilities due to congestion, is a serious challenge for hospital emergency departments nationwide.

However, the centers at New York-Presbyterian leverage patient flow automation software developed by TeleTracking Technologies to avoid bottlenecks and downtime for beds, as well as manage the patient experience after they are admitted.

"The PPOCs define the process and outline the correct way to process flow patients through the system," Meisner says. "They create the rules of engagement and the playbook—if you will—so now everyone is on the same page. It works, we get results, and it's proven to show growth in our organization. We've maximized our capacity. We had some capacity that we weren't utilizing and worked with our physicians to redefine what those beds are used for."

Satisfaction soars

Among other metrics, Meisner points to better patient satisfaction scores, increased emergency department volumes, a decrease in the time it takes transfer requests from other facilities, a reduction in

The center in New York-Presbyterian Hospital helps manage patient movement throughout the facility.

the time it takes for a patient to be admitted and placed in a bed, and a decrease in the average length of stay in the emergency department.

"It really helps create access for our patients in the community," she says. "We work closely with our transfer center because there are patients out in the field who are not getting much-needed care expertise. We actually have live video feed between each of our PPOCs and our transfer center so that we can talk to each other when we're trying to coordinate."

The sooner New York-Presbyterian identifies that a patient needs a bed and is able to accommodate that individual, Meisner adds, the more quickly the hospital can initiate a plan of care, one of the steps that's crucial to reducing a patient's stay.

Interest grows
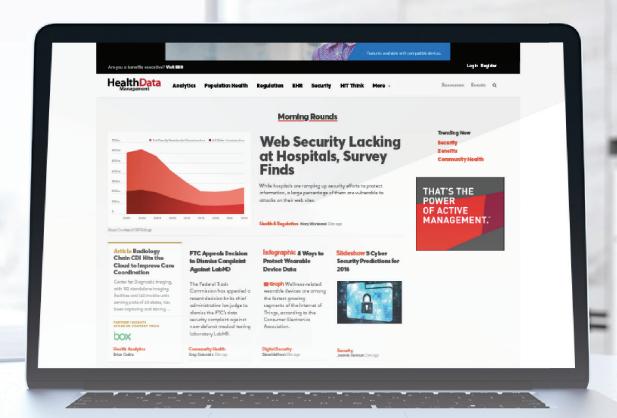
According to Terry, GE Healthcare Partners is in the process of implementing a command center at Rush University Medical Center in Chicago and at other undis-

closed healthcare organizations in Orlando and Portland. Each command center is unique in its focus. "They're like snowflakes. Every one is different," Terry says.

Likewise, Meisner notes that command centers can be customized to meet the specific needs of healthcare organizations. "Every hospital and academic center has its own uniqueness—there's no one-size-fits-all model."

Looking forward, Meisner says New York-Presbyterian is creating a behavioral health PPOC to become more efficient in serving a patient population that has historically faced a shortage of hospital beds.

"With all of our regional hospitals and campuses, we feel that we have an opportunity to really streamline our access for behavioral patients and also to provide more access for New Yorkers," Meisner adds. "We're going to have one central location where facilities and our own organization will be able to call and access those beds. Right now, we're trying to get a handle on it." ■

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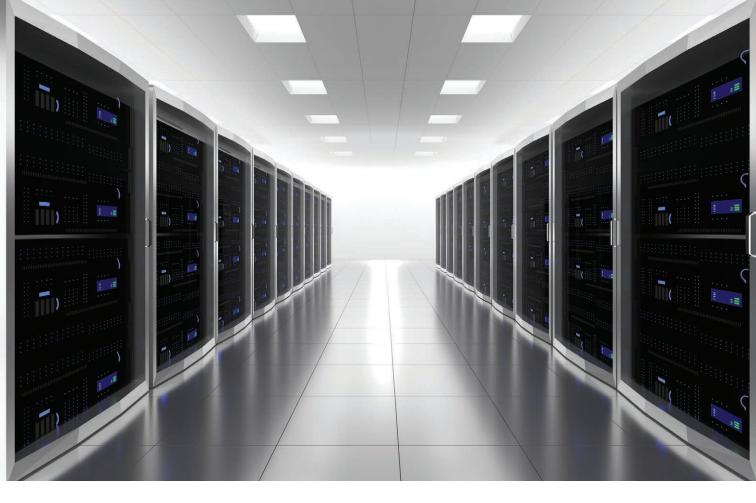
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MACRA SUCCESS STARTS
WITH IT

Groups need solid data to support care, quality improvement.

By John Morrissey

The transition to the Medicare Access and CHIP Reauthorization Act (MACRA) begins this year, and while some practices have bits and pieces of the technology they'll need, most will need to ramp up efforts quickly to enable them to advance quality, control cost and improve clinical performance.

Physician groups that have kept up with encouraged or required IT investments that support these dramatically different core objectives will have an advantage in meeting MACRA head on. For groups lag-

ging in using a certified electronic health record, developing analytics to guide them and pushing critical data out to their practitioners, experts say it's time to catch up.

The Medicare EHR Incentive Program, from which sprang meaningful use criteria, and the Physician Quality Reporting System (PQRS), which identified quality metrics for physicians to live by, are being ported into the Merit-based Incentive Payment System (MIPS), which most physician groups are likely to take in the first years of the transition.

MIPS is the extension of MU and PQRS,

revised to make it easier for providers to execute quality, resource-use and information-usage activities, says Lawrence Kocot, a partner at KPMG who heads its Center for Healthcare Regulatory Insight. "Practices that have begun to, or already have successfully moved to, the certified electronic health record technologies will be much better positioned to perform well under the advancing care information category of MIPS, and in MIPS generally."

MACRA prerequisites include having to meet meaningful use thresholds for certain capabilities, such as medication

reconciliation and patient portal use, says Krishna Ramachandran, MD, chief administrative officer of DuPage Medical Group, a Downers Grove, Ill., organization with 560 primary care and specialty physicians at 70 locations.

Meaningful use directives also sowed clinical practice improvement, a MIPS performance category, by prodding physicians into showing they were using IT to gather and report information in the service of improving care activities and innovation, Ramachandran says.

For medical groups with either a lagging commitment to meaningful use or no EHR platform at all, the final MACRA rule provided the option of easing through 2017 with a light burden of compliance with MIPS metrics, with 2018 serving as the year in which they will be fully transitioned to MACRA. But unprepared practices must heed and exploit this year's grace period, because otherwise the physician reimbursement program will leave them behind, warns Rob Tennant, health information technology policy director for the Medical Group Management Association.

The big fear in policy circles is that the one in three physicians who opt not to participate in the first year of MIPS are going to "sit on their hands and do nothing," says Kocot. "This is definitely going to be a rude awakening for some physicians if they don't use 2017 as a preparation year. They should start looking at how they should be reporting, and how to get their technology set up for the MIPS program."

Adding to the time crunch is the reality that the entire EHR-using world, not just the laggards, will have to upgrade this year to the 2015 version of certified technology to meet the MACRA level of performance, Tennant says. And that's just one element of IT acceleration that will be necessary.

In addition to executing meaningful use and PQRS objectives well, Ramachandran says, groups must continually connect physicians with must-know patient data in ways they can understand and act on. And

there has to be enough of an analytics platform to point out gaps in care.

Not just box-checking

At a surface level, the MIPS program involves achieving specific objectives and attaining levels of performance and outcomes that result in an overall score—initially weighted highest for meeting quality metrics targets, and also encompassing categories of advancing care information (ACI, the replacement for meaningful use), clinical practice improvement activities and, starting in 2018, resource use.

None of this can happen unless the right data is captured, and that requires an effort to determine where in a physician's workflow to first enter key data and later feed data back appropriately to providers to get the desired results, says Karen Knecht, chief innovation officer of Encore Health Resources, an IT consulting firm. It calls for an understanding of how physicians work, how their workflows are managed, and how they both generate and use information in the context of the performance requirements, she says.

The same data likely will be necessary to meet reporting and performance demands elsewhere, from commercial accountable care organization objectives to Medicare Advantage and Medicare Shared Savings Program operations, says Karen Adamson, CIO of DuPage Medical Group. The challenge for IT planning, especially with the EHR, is to integrate the requirements of all those programs, not just MACRA, she says.

One way to look at the prep effort is to do the minimum to avoid a payment penalty, "and that's fine," says Tennant. "But our argument is, how can you leverage the technology to improve the clinical performance of the practice?" To prevent situations in which, for example, a referred specialist didn't get records and has to reschedule, or an MRI lacked proper authorization, a practice should focus overall on moving data for both clinical and administrative purposes effectively and securely.

A central theme of MACRA revolves around information exchange and interoperability, getting access to the information that makes quality and clinical practice improvement possible, Knecht explains.

One important element of that process is the exchange of summaries of care, a requirement of meaningful use criteria that will have to be enabled fully and achieved routinely to operate in a MACRA environment, Tennant says. It should be on the development agenda for 2017, including in practices opting for the choice of a slower pace. "They may be able to get away with it in 2017, but going forward, we expect that to be a requirement. So can you develop a summary-of-care document through your EHR? If it's certified, then it has that capability, but can you exchange it with a downstream provider? And ultimately, in 2018, you'll need to receive it as well."

Integral to such an exchange capacity is a comprehensive set of secure electronic addresses to all practice partners or referral sources outside the range of the internal EHR, using the Direct messaging protocol, says Jackie Lichwell, senior manager of quality performance for athenahealth, a physician practice EHR vendor. Part of meaningful use Stage 2, the configuration of Direct addresses is provided to athenahealth customers as one of the included contractual services, Lichwell says.

The premium on effective collection and sharing of information, as articulated in the advancing care information category, has ripple effects extending to the effective management of patients and care handoffs along the continuum of care, Kocot says. Most of the capabilities required in that category, in fact, set up capabilities elsewhere. "The high performance in the ACI category actually may correlate with higher performance in the cost and improvement categories."

Performance facts

Clinical settings are expected to evolve into integrated networks and begin to be

judged and paid as groups. That will put a premium on the ability to look inward to the causes of higher cost and outward to patient encounters outside the network, and as those escalate in importance, so does the IT infrastructure to track and analyze cost, quality and utilization.

This is where variable performance among providers really starts to affect a group's overall scoring, says Kocot. "Clinicians do have to assess the relative performance of specialists—and, frankly, other members of the care team—when they're deciding on how to line up referrals or establish networks." Having good data on the doctors, especially when effective providers are working with others not doing as well, will by necessity lead to self-policing within the group, he says.

An organization as large as DuPage Medical Group uses a groupwide reporting option for PQRS and Medicare ACO performance, and will do the same for MACRA, says Ramachandran. But internally, reporting is by physician, and dashboard displays are at the individual doctor level—colored red or green, measure by measure, depending on whether each one was met or not. "No change happens on a team level; it's people who change," he says. A combination of competition and collaborative assistance, enabled by the reporting detail, improves the group-reported results for all.

For resource use management, currently a factor in DuPage's ACO contracts and soon a component of MACRA, the organization has to have data on not just what costs a group doctor generates, but also what a patient generates anywhere. Out-of-network leakage creates expenses the group doesn't have the opportunity to manage.

"We have some of the data, and technology to get us to figure out where is the leakage happening, where are the claims going, how do we redirect care appropriately," says Ramachandran. For example, it's four times as expensive to perform the same MRI study outside the group, which

if curbed is an easy cost fix.

The IT "doesn't have to be fancy," he says. To make sense of overuse of resources—inpatient stays, medications, specialists and so on—common data science software such as Tableau can go through many lines of claims code looking for a spike in expenses that a doctor didn't order for a patient but is on the hook for because the plurality of costs for services is attributed to the physician and the group.

For internal analysis of physician-level performance, a handy tool for the DuPage Medical Group is an electronic spreadsheet, with one line per doctor, one column per measure. "A bunch of bright people in a room, working on Excel conditional formating with raw data from [the EHR], can move the needle," Ramachandran asserts.

Alternative payment

The MIPS program, like the meaningful use and PQRS predecessors, is full of criteria to meet and report, the many elements rounding into a payment-associated assessment. Exceeding the target can earn bonus percentages of Medicare billings; falling short will cost as much as 4 percent of Medicare revenue.

As providers do their best to formulate clinical and technology responses to the ins and outs of MIPS, however, they also have to keep in mind that the federal government considers the program a bridge to the longer-term goal of living under alternative payment models (APMs), and as a vehicle to distance the practice of medicine from its fee-based foundations, says Kocot.

The MACRA rule's Quality Payment Program "was designed to make it increasingly

The IT "doesn't have to be fancy" to make sense of overuse of resources.
—Krishna Ramachandran

uncomfortable to remain in fee-for-service...to establish first a glide path to get to APMs, and that is the MIPS program," he says. Providers will be rewarded for succeeding at the MIPS approach, but the goal is to reward them for the types of process changes and results that they will be aiming for in APMs, Kocot explains.

Advanced health systems or large multispecialty medical groups that are set up to operate an integrated continuum of care and accept financial risk are headed straight to the APM track of the Quality Payment Program, says Knecht. The APM option has bonus payments already built in and dispenses with many of the specific process and technology targets contained in MIPS—because they're by definition built into a network that can handle ACO risk, including the gradations of downside risk in recently added higher tracks of the Medicare Shared Savings Program. CMS projects a small number of APM participants in the first year or two, but that's ultimately where health systems want to go, Knecht says.

Large integrated clinical networks are not typically homogeneous in their readiness for alternative payments, and may elect to participate in both tracks. DuPage Medical Group, for one, has aggregations of physician practices transitioning to both the MIPS and APM options, says Ramachandran.

Rather than MACRA-specific, the efforts tie in with the multiple frameworks necessary for other payment structures, from federal and commercial bundled payments to the DuPage organization's government/commercial partnership forged for a Medi-

care Advantage population of 75,000 beneficiaries, as well as commercial ACOs, he says.

Thus, clinical and cost-management objectives need to take into consideration both the immediate goals of meeting MIPS targets and building the core technology to manage care quality and financial risk as a coordinated enterprise.

For example, it's no small challenge to undertake information collection from a contingent of physician practices that is geographically dispersed and operating disparate EHR systems. Data from markedly different IT systems must be coalesced by practices to produce valid reports on quality metrics for MIPS participation, and information exchange capacity has to be addressed at the outset, says John Halamka, CIO of Beth Israel Deaconess Medical Center, Boston.
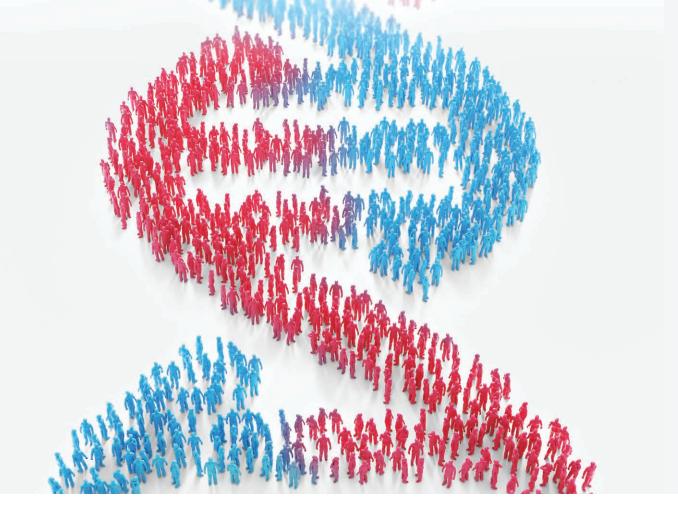
"We are going to need to compute quality and cost, [which means] taking an approach of building a registry yourself or with a third party, or partnering with a vendor of whatever is prudent, because it will be flexible and agile for whatever the future brings," Halamka says. Such vehicles already are in place, a carryover from the PQRS reporting process called a Qualified Clinical Data Registry.

Beth Israel Deaconess and other Boston-area health systems are using one such registry, the Massachusetts eHealth Collaborative, operated by the Massachusetts Medical Society. Halamka says it aggregates data from 2 million patients and 26 EHRs in the Beth Israel Deaconess network into a single database than can compute any quality metric submitted to any federal agency.

That's a solution to not only MIPS reporting but also the realities of an ACO world, with physicians not owned by the system but rather "loose coupled cousins" spread far and wide, he says. With a central data collection and exchange point, EHR systems don't have to be all on the same vendor platform; they just have to produce the kinds of data that has to be reported. ∎

BOOSTING CARE WITH
POP HEALTH

Provider initiatives delivering solid results.

By Linda Wilson

Texas Children's Hospital uses a population health approach, fueled by data analytics, to manage care for 4,500 young patients with diabetes. The goal is to reduce hospital admissions and lengths of stay as well as to increase the number of patients whose diabetes is controlled, which the American Diabetes Association defines as a hemoglobin A1c level of less than 7.5.

In 2014, the Houston-based hospital launched improvements in hospital care for children and teenagers newly diag-

nosed with either type 1 or type 2 diabetes. Those improvements included:

• Dedicated beds on an inpatient unit for children with diabetes and staffed with nurses trained in diabetes management and education.

• Patients treated entirely in dedicated diabetes beds rather than partially in the ICU.

• Standardized electronic best practice alerts and order sets.

• Care plans created with input from family members.

As a result of these changes, the average

length of stay dropped from 2.8 days in 2013 to two days in 2016.

Children's Hospital expanded the project in 2015 to its two suburban pediatric hospitals, including one slated to open in 2017; numerous outpatient settings; and community outreach efforts.

"Once we achieved those early aims, we realized that we had the momentum and bandwidth to start looking at a much larger population of patients," explains Rona Sonabend, MD, assistant professor of pediatrics and endocrinology at Baylor College of Medicine and medical director of clin-

ical systems integration process improvement and co-leader of the diabetes care process team at Texas Children's Hospital.

With the expanded focus, hospitalizations for diabetes ketoacidosis, or DKA, a life-threatening complication of diabetes characterized by high levels of ketones in the blood, declined. For example, the percentage of patients with multiple admissions for DKA in one year dropped from 24.2 percent in fiscal year 2015, which ended Sept. 30, 2015, to 12.4 percent in fiscal year 2016.

The hospital also logged improvements in A1c control for its youngest patients, those from birth to age 5.

Growing trend

Texas Children's Hospital is not alone. As part of their population health initiatives, health systems are segmenting patients into groups and defining care processes tailored to each group. They also are coordinating care across healthcare settings, teaching patients how to manage their health effectively, and helping chronically ill patients avoid high-cost ER visits and hospital stays.

The patient groups usually are formed based on chronic diseases, such as diabetes or hypertension; common preventive services, such as cancer screenings; high-cost patients or patients at risk of becoming high cost.

To segment patients into groups, health systems aggregate and then analyze data from EHRs, financial systems and other sources. After developing action strategies based on their analysis, they also use analytics to track improvements in costs and clinical outcomes by provider, clinic and institution.

For example, an organization-wide effort by Borgess Health, a three-hospital system based in Kalamazoo, Mich., decreased the number of adult patients with uncontrolled diabetes from 29 percent in March 2015 to 15 percent in June 2016.

To define this population, Borgess included adult patients with a hemoglobin A1c greater than 9 as well as adult patients with diabetes whose A1c had not been checked in more than a year. "From a population health perspective, anybody who was not screened in the last year is considered uncontrolled because you don't know what they are," explains Cindy Gaines, vice president and chief operations officer at Borgess Health.

After analyzing the data in that group, Gaines says, "what we found is that the actual percentage of patients who had a hemoglobin A1c of greater than 9 was only about 10 percent," demonstrating that providers' methods for teaching patients about diet and disease management were effective. "But we had this whole group of patients who hadn't been in in more than a year."

Borgess uses a cloud-based population health platform from Wellcentive, which was purchased in 2016 by Royal Philips, to define, analyze and measure outcomes for distinct populations of patients.

Armed with information about patients with uncontrolled diabetes, clinicians and administrators developed an action plan focused on getting patients who hadn't had their A1c level checked in more than a year back into the healthcare system.

"If we hadn't had the Wellcentive data analytics tool to help us to parse out those patients, we would have focused on education and diet, and that is not what they needed. They needed to be checked; that's a whole different action plan," Gaines says.

Borgess has applied the same approach to preventive care. One example is mammography. After analyzing aggregated patient data, Borgess executives realized that compliance with standardized screening recommendations varied by age group. "The older you became in our data, the more likely you were to get a mammogram," Gaines says. Women between the ages of 40 and 50 had the lowest screening rates for mammography.

The action plan for these women focused on making it easy for them to get a mammogram. For example, Borgess lets patients schedule their appointment on the health system's website and doesn't require patients to obtain a doctor's order for a routine screening mammogram.

These and other tactics paid off: The mammography screening rate for women between the ages of 40 and 50 rose from 68.25 percent in June 2015 to 74.71 percent in June 2016.

In the current fiscal year, which began July 1, 2016, Borgess is working on colorectal cancer screening. "Our biggest challenge has been the cleanup of the data," Gaines says. It was difficult for Borgess analysts to track colonoscopies if physicians performed them at non-Borgess facilities. While the health system's staff routinely scanned paper reports about these procedures into patients' EHRs, the information was difficult to find, Gaines says.

To solve this problem, the health system's staff now adds a label, which includes a unique identifier for colonoscopy, to each report before scanning it into the EHR. The unique identifier creates a discrete data element in the EHR that Borgess then pushes into the Wellcentive population database.

IT supports shift

Information technology is at the core of population health management at Texas Children's Hospital, too.

Children's Hospital exported data about numerous diseases from its EHR and other sources into an enterprise data warehouse, which it built using technology from Health Catalyst. From there, it developed patient cohorts, such as children and teenagers with diabetes who receive care at Children's facilities.

Health Catalyst's enterprise data warehouse architecture is based on what the company calls a "late binding" approach in which data from various sources is ingested into the EDW but not immediately formatted with standard vocabularies and rules. The formatting happens later to meet the needs a of a specific project.

Using this approach to data analytics,

Texas Children's Hospital developed a multifaceted action plan to improve diabetes care, going beyond an initial hospital stay. Children's staff diagnoses about 350 new cases of diabetes per year, and most of those children and teenagers begin treatment for the disease during their hospital stay.

For example, the hospital added behavioral health components to its outpatient care plans. Recognizing the role that behavioral health issues, such as depression, and socioeconomic factors, such as income, play in the ability of patients and families to manage diabetes, the hospital hired social workers and a psychologist with specialized training in diabetes to work with patients and their families.

Each patient meets with a social worker at least once a year; the number of additional visits is based on each child or teenager's current behavioral health needs or risk of developing behavioral health issues Children and teens at high risk of developing DKA are assigned to a social worker.

Children's Hospital also has standardized medical care delivered in the outpatient setting to all diabetes patients, adhering to American Diabetes Association, guidelines and including such metrics as frequency of doctor's office visits, routine blood tests and eye exams.

The hospital has expanded beyond its doors, too. For example, its staff developed webinars for pediatric nurses and physicians in the larger community, and it supports local girl scout troops comprised of girls with diabetes and their siblings.

"There are many, many balls being juggled at the same time with the goal of improving outcomes for these patients," Sonabend explains. "What we are really targeting is how do we improve the health of the entire population—not just when we see them as an inpatient and not just when they come in for their office visits? How do enhance the entire population's health?"

Solving complex cases

In addition to chronic diseases and preventive care, health systems also stratify patients who are medically complex and high cost as well as those at risk of becoming high cost.

Partners HealthCare has been working to define and coordinate care for these chronically ill patients since 2006.

Partner's Integrated Care Management Program, or iCMP, evolved out of a Medicare demonstration project at Massachusetts General Hospital in which care managers helped the sickest 15 percent of Medicare beneficiaries navigate the healthcare system.

During the program's first three years, Massachusetts General saved $2.65 in healthcare costs for every $1 it spent on the program.

Since then, Partners has expanded the iCMP to its other facilities and all public and private insurance plans. Partners now targets patients at risk of becoming very high cost. "We are looking at those who are projected to hit the top 1 percent of expenses," says Sreekanth Chaguturu, MD, vice president of population health management at Partners. The goal is to intervene with care management services before patients' health declines to the point where it is difficult to control costs.

The program revolves around the work of about 100 nurse care managers, who develop customized care plans in collaboration with primary care providers and patients. The care plans "are very specific to that patient's needs," covering biomedical, social and mental health issues, Chaguturu says.

Care managers then execute those plans for up to a year through office visits, home visits and phone calls. They address issues that impede patients' ability to comply with their care plans, and they also coordinate services, such as transportation, diagnostic tests and care provided by medical specialists.

Care coordination

Northwestern Medicine Physician Partners, a clinically integrated network that operates primarily in Chicago's western suburbs, launched its care coordination program for chronically ill patients in April 2016. The patients in its program have an average of four chronic conditions, including behavioral health diagnoses, as well as social issues that make it harder for them to follow their care plans, such as the lack of a caregiver in the home.

The program employs 12 care managers who coordinate care in conjunction with about 120 primary care physicians.

Patients for the program are drawn from among 50,000 enrollees in numerous value-based public programs and commercial insurance contracts. "The care management nurses will be involved with the patients, either two or three times a week or monthly," says Gary Wainer, DO, medical director of Northwestern Medicine Physician Partners. "We continue to contact those patients until their care plan has reached a level of stability, and they have improved in their self-care."

As part of its goal to improve care for chronically ill patients, Wainer says Northwestern is evaluating new options to address behavioral health needs, such as using telemedicine technology for virtual counseling sessions. "We are still very much in the study phase," he says.

While most of the work in population health management nationally has occurred at the primary care level through care coordination and other programs, Partners also has expanded its focus to include specialists. To do this, Partners has brought groups of physicians within a specialty together in committees to develop clinical quality measures.

Partners exports data on specialty services from financial systems, medical records and other sources into an electronic data warehouse, which the health system built using the late binding data architecture from Health Catalyst. Specialists use analytic tools from SAS to analyze the data. Their work "is much more of a classic explorative use of a warehouse for things we have not fully defined," Chaguturu says. ∎
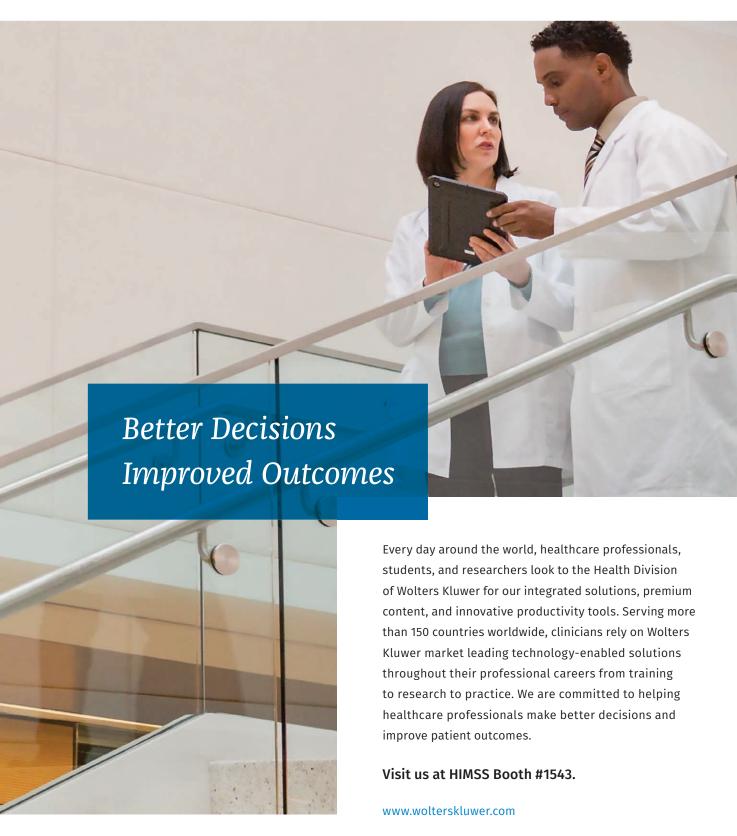
VISIONARIES

Healthcare's Future:

Making the most of technology, new and old as healthcare organizations turn visions into realities, leaders are looking to leverage disruptive innovations as well as established solutions.

Healthcare Organizations Expected to Adopt New Innovations

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Diana Nole, CEO
Wolters Kluwer
Health

What do you envision as the most promising healthcare technology innovations poised to emerge over the next five years?

There are many technology innovations emerging in healthcare but one in particular, the digitization of healthcare information, is leading the way. However, in order for healthcare organizations to unlock the advantages associated with digital information, barriers related to interoperability must be removed and operational workflows must be optimized. As these challenges are overcome, information can be analyzed, used, and communicated within new technologies to further advance patient care, improve efficiencies, and reduce costs. Managing populations of patients and advancing clinical decision support are also areas poised to emerge as opportunities over the next few years.

With so much innovation, how can healthcare leaders prioritize their information technology investments?

Healthcare payment reform and a focus on improving the overall quality of care are major priorities in the industry, and also occurring rapidly. Healthcare leaders should focus on technology investments that will advance care while reducing costs. For example, technologies that help healthcare leaders understand where variability occurs in patient care, identify sources of unnecessary costs, evaluate care quality across the entire care continuum, and ultimately lead to improved clinical decisions and patient outcomes should be of highest priority.

How will healthcare organizations use technology to get consumers more engaged in their care?

Studies have shown that the use of patient education and engagement technologies result in better healthcare experiences and improved patient outcomes. Patients who participate in their healthcare journey have a deeper understanding of how to manage their care including the most effective way to take medications and fulfill other prescribed treatment plans. It also allows patients to communicate more effectively with their providers. Both patients and healthcare organizations can benefit from the adoption of interactive and intelligent technologies such as treatment monitoring, multimedia educational programs, and automated communications as a way to enhance the patient experience and, more importantly, the care outcome.

For many years healthcare organizations have worked to implement technologies such as EHRs. How can organizations now optimize these solutions to actually improve clinical and financial outcomes?

Most healthcare organizations would agree that the intended benefits of EHRs to deliver greater efficiency, reduce healthcare costs, and improve care quality have yet to materialize. One of the single biggest ways healthcare organizations can leverage EHRs to improve clinical outcomes and reduce costs is to ensure their EHR is seamlessly interoperable with their other healthcare IT systems. By sharing pertinent patient or clinical information across the care continuum, better clinical decisions can be made, errors can be caught, and unnecessary costs can be avoided. This is just the beginning. In time, this ecosystem of healthcare technologies will enable a complete digital view of the individual patient as well as populations of patients, and will unlock the power within the data to allow healthcare organizations to truly deliver the highest quality, most consistent care at the lowest cost. ■

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Positioned for the future in healthcare IT

Liberty Solutions looks ahead to new innovations and growing demands in health data management

Since 2002, Liberty Solutions has provided expert application and clinical transformation services for healthcare IT clients across the country. Company president Sam Violanti offered his views on what healthcare organizations can expect to see in the next several years as the demand for data and real time data analysis continues to grow.

Sam Violanti, President

Emerging innovations will require optimization

Over the past few years, healthcare organizations in the United States have installed countless IT systems for data management and electronic records keeping. Now, the demand for data is growing as new technologies such as wireless and portable devices are used more and more in healthcare. A healthcare organization's existing IT system must be able to integrate with emerging technologies to handle the increased data. Furthermore, the focus on population health – an approach to health care that aims to improve the health outcomes of an entire group or population of individuals – will push the demand for data and data analysis even further. In five years, there could even be patient implants that provide data for physicians and health care professionals.

"System optimization will be the key," Violanti explained. "Healthcare organizations will need to make adjustments to optimize IT systems to handle workflow changes and such that result from all the data that needs to be managed."

Setting priorities for IT investment

Healthcare organizations will need to embrace the emerging technologies, but with all the rapid changes, how do they prioritize their IT investments?

"Prioritization will start at the top, as healthcare leaders empower their team to deliver IT solutions across the system with a vision for the ultimate goal of healthier patients and populations," Violanti said. "When Liberty Solutions works with clients in such situations, we help them prioritize and provide the services needed to drive the project to completion,

efficiently and cost-effectively."

Violanti noted that his consulting firm helps clients prioritize with a team of experts who have experience in laboratory, pharmacy, nursing and other healthcare settings, giving them a big picture understanding.

Engaging consumers

As part of the data generation and data analysis equation, healthcare organizations will need to work on engaging consumers to use the new technologies such as patient portals, outpatient monitoring devices and other wireless systems.

"Technology fails when people do not think it's valuable or don't know how to use it," Violanti pointed out. "The effort must be made to educate the consumer to make sure they understand how to use the technology and why it is important to helping them stay healthy."

Liberty Solutions offers comprehensive training and education services to help healthcare organizations better engage with consumers and make patient technologies more useable.

Better patient health from better data management

Improved clinical and financial outcomes will result from the healthcare organization optimizing its IT systems to handle the growing demand for data management.

"Before the challenge was implementing the system – now it is using it better to collect data in different ways that ensure efficiency and accurate analytics," Violanti concluded. "Better health comes from better data management." ■

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Rob Strechay, VP Product, Zerto

What do you envision as the most promising healthcare technology innovations poised to emerge over the next five years?

One of the most interesting areas of technology advancement in the medical field is the area of remote clinical technology. Wearables, and the biometric data and patient monitoring information they can collect, will become mainstream. This is especially true with the explosion of home healthcare. Developments in the area of remote care via video and mobile applications are also progressing nicely. However, all of these advances share the "big data" problem. Healthcare providers not only have ever-increasing amounts of data to store, manage and protect, but the critical applications that rely on these data sets also need to be considered. And because healthcare organizations do not know which data may be important to care in the future, they have to keep it all, make it accessible and protect it.

With so much innovation, how can healthcare leaders prioritize their information technology investments?

Investments in Healthcare IT need to focus on creating more efficiency in the data center. The "big data" issue mentioned earlier cannot be underestimated. In this highly-regulated industry, every bit of patient data needs to be carefully logged, saved and protected to ensure it's always accessible to maintain high-quality patient care and safety. Healthcare IT departments have some heavy lifting to do. Technologies that help providers consolidate data centers and turn up true hybrid-cloud environments, while also protecting and better managing more data in the cloud (private, hybrid and on-premise), will gain market share.

How will healthcare organizations use technology to get consumers more engaged in their care?

Healthcare providers do not have the luxury of waiting to see if patient outcomes have been improved and if the care they provide is more engaging for consumers. They need to provide care efficiently and effectively from day one or risk readmission and subsequent penalties. I have heard that current estimates for readmission fines to hospitals at nearly half a billion dollars. Even with the Affordable Care Act unraveling, we are still likely to see some of these fines being paid.

For many years healthcare organizations have worked to implement technologies such as EHRs. How can organizations now optimize these solutions to actually improve clinical and financial outcomes?

EHR implementation is probably the single most valuable consumer-facing technology to come to the healthcare industry in decades. Healthcare providers that have implemented simple record accessibility for end-users and providers are the clear winners. Patients consistently rate their care better when they can quickly and easily see lab results, doctor recommendations and more. But the deployment and integration of these systems is complex. And what if a provider decides they'd like to try more cost-effective infrastructures for these systems like using the cloud? In many cases, providers have locked themselves in to one technology or another without realizing it. Asking the question, "what will my data center look like in 5 years, 10 years?" can help IT professionals understand the risks of lock-in.

How can healthcare organizations justify investments in new or innovative technologies?

Justification in innovative technologies must be made with an eye on keeping patient care standards high while lowering ongoing costs and complexity of the provider's IT infrastructure. How can the data from these advanced technologies be stored, protected and moved if changes are necessary? My company, for example, often helps providers "future-proof" their IT investments by helping to ensure that innovative applications can be moved (say, to the cloud) if needed and protected for patient safety and HIPAA compliance. ■

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Lisa-Jean Clifford, CEO

What do you envision as the most promising healthcare technology innovations poised to emerge over the next five years?

With the ever-changing landscape of best of breed solutions, single vendor solutions (which are typically many best of breed solutions that have been acquired by a single vendor and then integrated), and the expansion of the laboratory's role in personalized patient care – the most important innovation in the next five years in healthcare will be an application interface platform. Technology vendors who are able to deliver a middle layer of technology that enables the fast, efficient and seamless integration of multiple software interfaces within a facility (hospital, lab, network, etc.) will provide their customers with a unified solution that allows them to pick the best application or technology for each of their needs.

With so much innovation, how can healthcare leaders prioritize their information technology investments?

That's the beauty of this approach – healthcare leaders can prioritize their information technology investments based upon their business goals and objectives as well as their healthcare initiatives. If they invest in the middleware platform, they can choose what to bring on and when. The 'heavy lift' of years past will be replaced with tweaking and fine tuning.

How will healthcare organizations use technology to get consumers more engaged in their care?

There are user friendly, secure customer portals available today that allow a lab or facility to provide patients access to their test results, educational materials, chronic disease management links, etc. This is an example ofanother technology solution that can be easily integrated into the organization's IT infrastructure.

For many years healthcare organizations have worked to implement technologies such as EHRs. How can organizations now optimize these solutions to actually improve clinical and financial outcomes?

The optimization of these solutions is through the adaption of them into the workflow and practices of the lab. It's about the level and ease of integration, the data collected and its accessibility. The data is a gold mine to the lab with the ability to run reports based on any criteria they choose to focus on. I recommend starting with a handful of data points to evaluate, trend and make business decisions to improve ROI, reimbursements, turnaround times, corrections, process improvements. Then add another set – rinse and repeat.

How can healthcare organizations justify investments in new or innovative technologies?

The biggest justifications are the improvements in bottom line and accuracy. If you invest $100K in a technology that will improve your outcomes and save you $200K, then it is a win. It's not hard to justify innovation if you are well armed with the facts. The way to be best prepared to 'fight' for your business/lab/goal is to understand what the overarching business objectives are and to have the vendor you select help arm you with the facts to show how their solution will help you meet, or exceed those objectives. It's a team effort with healthcare leaders knowing their business needs and the vendor understanding their technology. ■

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Jonathan Dambrot, CEO & Co-Founder at Prevalent, Inc.

What do you envision as the most promising healthcare technology innovations poised to emerge over the next five years?

I think technology will continue to evolve to greatly improve the patient experience and at the same time, create better and more affordable care. However, it also introduces large security concerns about protecting that data as it is shared between doctors, facilities and third-parties. All that information in electronic format is extraordinarily convenient, but also an exceptionally tantalizing target for cyber criminals.

With so much innovation, how can healthcare leaders prioritize their information technology investments?

Military professionals understand the need for force protection and support, that it takes x number of support and infrastructure troops to cover every combat soldier deployed. Similarly, healthcare organizations need to consider the ratio of IT and application investment to complementary security expenditures. Every time a new application is deployed, or additional records are digitized, it creates an additional target. Attention should be given to the protection of electronic information from myriad attackers in healthcare organization is the number one priority.

How will healthcare organizations use technology to get consumers more engaged in their care?

To some extent, this is already happening. Basic reminders for your annual checkup come through your phone. Insurance companies now offer "tele-doc" services where a doctor can remotely prescribe medication. Prescription refills can be re-ordered without human intervention. Technology, however, offers the promise of enabling a much more cooperative relationship between healthcare providers and their patients. What if your doctor could review your Fitbit feed? Other sensors could emerge over time that can track blood pressure, hydration levels, blood sugar, etc., all of which can be connected to a central data processing application that could provide alerts, or simple recommendations for improvements. The possibilities are limitless.

How can healthcare organizations justify investments in new or innovative technologies?

Improved patient experience. Cost savings. Lower risk of mistakes. Securing patient data. The justification for technology investment in the healthcare space literally writes itself. Cybersecurity is top of mind in all industries right now, but especially in healthcare. The total cost of a data breach to a healthcare organization could be catastrophic. ■

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Healthcare Organizations Look to Embrace Disruptive Technologies

The healthcare information technology market is poised to reach $228.7 billion by 2020, growing at a compound annual growth rate of 13.4% each year between 2015 and 2020, according to a report from Markets and Markets. The clinical solutions segment is leading this growth spurt, as it is expected to increase 19.8% annually during the five year period, according to the India-based market research firm. >>

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Joe DeSantis, Vice President, HealthShare, InterSystems

What do you envision as the most promising healthcare technology innovations poised to emerge over the next five years?

Advances in telemedicine, wearables, personalized therapies, and the Internet of Things (IoT) are just a few examples of exciting new ways to diagnose and treat patients. These advances are also exacerbating the challenge of collecting, sharing and understanding the massive amounts of data that these technologies generate.

Large and innovative healthcare organizations are looking to harness that massive – or "big"- data to improve patient health and care. They want to derive insights from their data, to make the best decisions at the point of care. They want to perform big data analysis, predictive modeling and machine learning using healthcare data, and draw on all data formats including unstructured data. To do this, they require the interoperability to incorporate the results of this analysis back into the clinician workflow.

With so much innovation, how can healthcare leaders prioritize their information technology investments?

I doubt there is a single healthcare technology innovation you can name that does not depend on a comprehensive, secure, and interoperable repository of healthcare information. That's why you need to begin with a proven, standards-based health informatics platform that will provide the essential data management, connectivity, and analytics foundation. As the healthcare organization adds new patient-centered applications, the right platform will grow and adapt along with it.

The goal is a complete and extensible health data model that combines clinical, claims, and patient-generated data. This is the top priority for healthcare technology investments.

The good news is that this foundational technology is available today. Instead of having to invent their own data models, organizations can leverage existing platforms and focus on quickly getting to value.

How will healthcare organizations use technology to get consumers more engaged in their care?

Consumers are already very engaged in some ways. They are embracing new technology like wearables and personal fitness devices. And they want more direct access to their healthcare records and greater control over their own data.

What consumers have lacked in the past is the ability to see all their health data in one place through a comprehensive health and care record spanning all their care providers. That, too, is changing, with the emergence of new patient engagement solutions that are not tethered to a single EHR. These include universal patient portal solutions that present data in a consumer-friendly and easily digestible manner, for example, in a chronological timeline – much like a Facebook page – or upcoming appointments in a visual calendar format.

For many years healthcare organizations have worked to implement technologies such as EHRs. How can organizations now optimize these solutions to actually improve clinical and financial outcomes?

In this emerging digital environment, the EHR will no longer be the center of the healthcare IT universe, but only one contributor to the connected health and care record. The key driver of improved clinical and financial outcomes will be that essential connectivity layer that will enable care coordination and patient-centric healthcare applications. Only when that connective tissue is in place will we transform big data into clinical insight and value. ∎

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Healthcare Organizations Look to Embrace Disruptive Technologies

This finding is not all that surprising as healthcare organizations are expected to be under increased pressure to improve clinical care outcomes under emerging value-based care models – and will be looking for technology to move them in the right direction.

"Navigating new technologies is one of the biggest challenges we hear about from hospital leaders," says Robert Maliff, director of applied solutions for ECRI Institute, in a statement. "They simply can't afford to miss the mark on which clinical advancements to bring in to improve patient care."

Certainly, with this focus on clinical outcomes, many healthcare industry observers and leaders are predicting that organizations will gravitate toward new, innovative technologies, especially those that address patient care needs. Indeed, Benjamin Isgur, the leader of the PwC Health Research Institute and one of the authors of Top Health Industry Issues Of 2017: A Year of Uncertainty and Opportunity, says "2017 is the first year that the healthcare industry is seeing a whole new wave of technology. The last decade, the healthcare industry has seen the implementation of various iterations of electronic health records. Then, in the last few years, we saw a wave of mobile devices. But now, there is a move toward more disruptive innovations."

The PwC report, in fact, urges healthcare organizations to "prepare for the eventual arrival" of technologies such as:

- **ARTIFICIAL INTELLIGENCE:** Software algorithms that perform tasks that usually require human intelligence
- **AUGMENTED REALITY:** Virtual additions to the physical work that change the user experience
- **BLOCKCHAIN:** Distributed electronic ledger that can record and confirm transactions securely
- **DRONES:** Pilot free vehicles and devices
- **INTERNET OF THINGS:** a connected network of objects that collect and exchange data
- **ROBOTS:** Machines or virtual agents that automate, augment or assist human activities
- **VIRTUAL REALITY:** Interactive simulation of a 3-D image or complete environment
- **3D PRINTING:** Additive manufacturing techniques used to create three dimensional objects

Bertalan Meskó, Ph.D., a medical futurist based in Budapest, Hungary, also predicts that a variety of innovative technologies could take hold in healthcare during 2017. He points to artificial organs, driverless cars with health sensors, surgical robots and wearable sensors as a few of the innovations that could come to fruition in the near future.

Artificial intelligence, however, could be the technology that is most ready to have a significant impact on healthcare. Using artificial intelligence to get more out of existing data, in fact, is "the first step in revolutionizing existing healthcare systems," Dr. Meskó says.

Artificial intelligence was also one of the technologies cited by the ECRI Institute, in its report Top Ten Hospital C-Suite Watch List. The Plymouth, Pa.-based nonprofit organization that researches the best approaches to improving patient care also suggested that C-level leaders keep an eye on technologies such as liquid biopsies; genetic testing and biosensor for opioid addiction; abdominal surgery initiatives that include web-based risk assessment algorithms and patient coaching; horizon canners; robotic surgery; fluorescent endoscopic imaging; immunotherapy and stem cell therapy for Crohn's disease; and Type 1 diabetes vaccines.

For the healthcare industry to tap into the potential of artificial intelligence, however, the industry needs to create ethical standards that will guide the use of the technology; medical professionals need to acquire basic knowledge of artificial intelligence and how it can work in a medical setting; and, patients need to become comfortable with the use of artificial intelligence and discover its benefits for themselves, according to Dr. Meskó.

Perhaps most importantly, decision-makers at healthcare organizations need to "push companies toward offering affordable artificial intelligence solutions, since that is the only way

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ON THE ROAD TOWARD TECHNOLOGY OPTIMIZATION

More than 95% of hospitals and 80% of physicians have implemented EHRs, according to Office of the National Coordinator for Health IT. But many are still looking to get the most out of these systems.

According to the data from the third quarter 2016 HIMSS Electronic Medical Record Adoption Model (EMRAM) program, while many providers have now reached the more sophisticated stages of adoption, only 4.6% of inpatient care providers have reached stage 7, the final plateau on the 8 point scale, which measures exactly how organizations are utilizing their EMRs (see chart).

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Rick Ingraham, Director, Vertical Markets

What do you envision as the most promising health care technology innovations poised to emerge over the next five years?

Examining how the overall health care arena operates today—in terms of data being used and ignored—a great opportunity lies in operationalizing social determinants of health into all intersections of managing patient care, support and engagement. Socioeconomic data offers tremendous value in quantifying social health attributes and risk mitigation to paint a much broader picture of patients and the external factors that influence exposure to health complications. Health care providers will be able to go beyond the diagnosis of a condition to anticipating need for heightened preventive engagements.

Better integration between clinical data and socioeconomic data will allow us to ask better questions—not just what, but why—and derive new insights. This will enable health care providers to be more proactive in improving patient care and predicting health outcomes more reliably. We'll be better able to identify people at risk, pinpoint and take measures to prevent problems, and better plan for the future.

With so much innovation, how can health care leaders prioritize their information technology investments?

Health care leaders cannot be penny-wise and pound foolish. Improving patient experiences and clinical outcomes should drive information technology investments. However, looking for short-term immediate ROI must not be construed as what is best for patients when accepting longer term returns may lead to investments with greater care impact.

With the ongoing shift from fee-for-service to fee-for-value payment models, we can't focus only on immediate benefits. To provide real value, our investments in information technology must enable providers to anticipate and prevent future problems. They must help us find new ways to address the quality, safety and efficiency of care.

How will health care organizations use technology to get consumers more engaged in their care?

Increasing patient engagement begins with a shift in focus. No longer can health care providers focus solely on treating the sick. Their emphasis must change to promoting health through lifestyle, preventive care and early intervention. Toward that end,

here are four ways to foster patient engagement:

1. Community Outreach - Health care providers should reach out to patients on an ongoing basis, not just when the patient is ill. They must interact with patients earlier and in non-traditional settings by getting out into the communities where people live and work.

2. Health Data - Providers should develop new strategies to use patient-generated health data to improve care. Technology like wearable trackers and smartphone apps can help us open dialogues about personal health issues.

3. Social Media - Online communities offer an opportunity to deliver clear, useful health care information directly to targeted audiences.

4. Patient Portals - Providers can use portals to connect personally with patients, provide education on health-related issues and encourage behaviors that result in the highest quality of life.

For many years health care organizations have worked to implement technologies such as EHRs. How can organizations now optimize these solutions to actually improve clinical and financial outcomes?

EHRs provide many advantages, but they're not enough. Health care organizations need to augment the data in EHRs with a clinical decision support (CDS) system to assist providers in making patient care decisions.

A CDS system can offer evidence-based clinical guidelines for diagnosis and protocols for treatment. It can provide information about drugs, cross-reference patient allergies to medications and generate alerts for potential issues like drug interactions. The goal must be safer, better and more efficient care.

How can health care leaders create an organizational culture that is open to adopting innovative technologies?

Leading-edge organizational cultures traditionally succeed or fail based upon the degree to which they nurture collaboration, innovation and creativity. Health care leaders must create collaboration labs and diverse consortiums of education in which we share information and explore new technologies, even if their application isn't immediately evident. Innovation doesn't happen in a bubble. We need to put competition aside and work together to find ways to provide effective care and better health at lower costs. ■

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Healthcare Organizations Look to Embrace Disruptive Technologies

to bring the promise of science fiction into reality and turn artificial intelligence into the stethoscope of the 21st Century," Dr. Meskó says.

MAKING THE MOST OF WHAT YOU'VE GOT

In addition to working with technology vendors to cost effectively acquire new technologies, healthcare organizations also can move their information tech-

an electronic health records system, you can integrate medical devices into the system so you can reduce the documentation requirements for nurses," Gerard says. "By relieving nurses of this burden, you can give the much more time to focus on direct patient care."

Similarly, Gerard points out that healthcare organizations could also get more out of their investments in locating systems that use radio frequency identification (RFID) by exploring multiple applications of the technology. "RFID

risk of wandering. That way you could monitor them and keep patients safe."

While it is important to explore what new innovative technologies can bring to the table and how to better leverage existing solutions, organizational leaders should make sure that they always take a big picture approach. According to the PwC report, organizations should consider how these new innovations can work together and "avoid making the common mistake of adopting technologies individually, as

STAGE		2016 Q2	2016 Q3
The Electronic Medical Record Adoption Model: A Snapshot of Healthcare Organization Progress			
Stage 7:	Complete EMR, Data Analytics to Improve Care	**4.5%**	**4.6%**
Stage 6:	Physician Documentation, full clinical decision support system (CDSS), Closed loop medication administration	**29.8%**	**30.5%**
Stage 5:	Full R-PACS	**34.8%**	**34.5%**
Stage 4:	Computerized Practitioner Order Entry, Clinical Decision Support (clinical protocols)	**10.0%**	**10.1%**
Stage 3:	Clinical documentation, CDSS (error checking)	**14.4%**	**14.1%**
Stage 2:	Clinical Data Repository, Controlled Medical Vocabulary, CDS, Health Information Exchange (HIE) capable	**2.3%**	**2.2%**
Stage 1:	Ancillaries: lab, radiology, pharmacy – all installed	**1.8%**	**1.7%**
Stage 0:	All three ancillaries not installed	**2.5%**	**2.4%**

Source: HIMSS Analytics

nology programs forward by optimizing the technologies that they already have in place, according to Erik Gerard, principal at Impact Advisors, a consulting firm located in Naperville, Ill. (see sidebar)

"Quite frankly, you really can build the hospital of tomorrow using proven technologies of today. Organizations don't have to start over. They can use what they have and add more capabilities to better leverage their technology investments. For example, if you have

can used in many ways. It can be used for equipment tracking. If you look at how a nurse on the floor spends her time, a surprisingly large amount of it is spent finding needed equipment. If you had RFID chips in the equipment, the nurse would be able to bring out her smart phone and find the equipment immediately – instead of wandering around for 15 minutes trying to find it," Gerard says. "You could also put RFID chips into wristbands on patients who are at

point solutions." As such, they should develop comprehensive strategic plans that define each technologies role in the wider digital health ecosystem. In addition, healthcare organizations will need to recruit and train the talent required to fully leverage innovative technologies and take the steps required to address the data security concerns associated with the increased use of emerging technologies, according to the PwC report. ■

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Peter Masanotti, CEO

With so much innovation, how can healthcare leaders prioritize their information technology investments?

Business health is linked directly to the overall health of member populations. When technologies, people and data work in harmony, a real, positive impact can be made on the health of individuals and populations. Sound investments in innovative, nimble technologies that integrate data systems and grow alongside organizations are key to providing quality care that improves populations and reduces costs.

Technologies that streamline the management of patients with the most complex conditions while also maintaining the wellness of healthy as well as at-risk populations should be prioritized as the most effective way to reduce costs and improve care quality.

For many years healthcare organizations have worked to implement technologies such as EHRs. How can organizations now optimize these solutions to actually improve clinical and financial outcomes?

As EHRs and EMRs are more widely implemented, there is a greater need to make the data within EMRs/EHRs available and actionable across systems. Integrating electronic records with a care management system provides synergy on all levels: among individuals and teams; payers and providers; and within clinical, IT, financial and other data sources. Centralized data mined from EHRs/EMRs trigger care that is timely, comprehensive and considerate of all member health circumstances. Workflow efficiency, in tandem with utilization and care management, improves the health of members, who receive the best possible care each time, and reduces costs by ensuring only appropriate, non-duplicative care is provided.

How will healthcare organizations use technology to get consumers more engaged in their care?

All consumers are better able to achieve maximum health with well-coordinated and appropriate health management that engages them directly. The most innovative technologies for member engagement are those that are integrated with robust care management systems. When the centralized data and actions of the care management system communicate with the integrated member engagement tools to trigger outreach/interventions and share data (be it via telehealth, remote monitoring, wearables, member education, etc.), the triggered engagement they experience is more timely, comprehensive and attuned to individual needs. Integrated member care and engagement leads to a greater likelihood of commitment to wellness.

What do you envision as the most promising healthcare technology innovations poised to emerge over the next five years?

We expect to see universal, longitudinal care records that travel with patients; analytics-driven workflows across care teams including providers, patients, caregivers, and insurers; consumer wearables; in-home monitoring and telehealth expansion and finally, ubiquitous access to care information.

Such innovations require advanced information integration to deliver 360-degree, longitudinal views of patients regardless of location, health plan or provider. Unifying all health information captured during a patient's health journey will allow these innovations to flourish and help providers, patients and care teams achieve the best quality care and outcomes.

What is the most significant factor to consider before to adopting a new, innovative technology?

Before investing time, budget and resources in a complex and lengthy technology adoption, healthcare organizations should scrutinize the implementation record of the vendor. The number of on-time and on-budget implementations previously completed, as well as the overall client satisfaction rate are metrics that should be provided and examined before a system is selected. The most beneficial implementations are those that are tailored to meet the unique needs of the organization, provide above-average knowledge sharing and ultimately offer the organization eventual independence and autonomy.

Technology investments that focus on reforming the care and management of patients with the most complex conditions and empowering the healthy to stay healthy should be at the top of the priority list. ■

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Beyond Dreams:
Doing What it Takes to Leverage Technology

During a commencement speech at Dartmouth College in 2014, Golden Globe-winning television writer and producer Shonda Rhimes talked about the difference between dreaming and doing: "Dreams are lovely. But they are just dreams – fleeting, ephemeral, pretty. But dreams do not come true just because you dream them – it's hard work that makes things happen. It's hard work that creates change. So… ditch the dream and be a doer, not a dreamer."

Leaders at Children's Health, pediatric system based in Dallas, can relate to Rhimes' sentiment as they know first-hand what it takes to go beyond dreaming and actually move the information technology needle forward. Indeed, to bring advanced technologies to fruition, healthcare organizations must first recognize a real patient need, then identify the technology that could fill this care gap and finally roll up their organizational sleeves to successfully utilize the technology.

"What makes advanced technology programs really sustainable and what makes them work well is if there is a need. It's great to have a wonderful device or the next great gadget, but if there is no need for it, it will not function well," said Tamara Perry, director of virtual health operations.

For example, leaders at Children's Health started to look for technology solutions that were specifically designed to improve medication adherence with post-transplant patients after discharge to help prevent and reduce readmissions. As a result, they implemented a remote monitoring program for post-surgery transplant patients.

"When patients go home after a liver or kidney transplant, we send them home with a kit that includes a tablet as well as devices such as a blood pressure cuff and a pulse oximeter," Perry said. "Through the tablet and connected devices, the patients send information to care providers. They tell them how they feel and if they have taken their medicines."

If the patient is not feeling well or if their blood pressure or oxygen saturation readings are in abnormal ranges, a virtual visit is scheduled. During the virtual visit, the care provider discusses the situation with the patient and attempts to identify what's needed to move care forward.

For example, during a recent virtual visit, the clinician asked the patient if he was taking his "beige" pills and the patient said he doesn't have any beige pills. So, the clinician asked the patient to lay all of his medications out on the table, so she could see them. Through the video call, the clinician saw the pill and clarified to the patient that it is actually off-white. The patient did not know what color was beige. So, the confusion was cleared up and the patient then knew which pill to take.

"Without the remote patient monitoring, the patient could have gone weeks without taking the correct medication or without taking any medication. And, the transplanted organ could have gone into failure and the patient would then require another procedure," Perry said.

While the remote monitoring via the tablet helps, clinicians still wanted to do more to improve medication adherence. "We work with a lot of teenagers. And, you know how teenagers are. If they are feeling great, they figure they have no reason to take medicine," Perry said. "Then, they start feeling bad and caregivers will ask if they took the medicine and they will say they took it

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Eric Rice, Chief Technology Officer

What do you envision as the most promising healthcare technology innovations poised to emerge over the next five years?

Healthcare providers, payers, and patients will see growing value in data analytics - from driving efficiencies to improving patient care, managing treatment plans, prescribing patient specific preventative plans, diagnosis, and more. Data analytics will bring intelligence to healthcare data. In order to recognize this value, healthcare organizations need a strategy for consolidating and gaining control over their data to make it accessible. Decisions made today on how you consolidate and manage your data will have a significant impact on your ability to adopt new technologies tomorrow, including data analytics. Consolidating and managing the data in a standards based format with a standards based service layer today is an essential step to prepare for the future.

With so much innovation, how can healthcare leaders prioritize their information technology investments?

The number one priority should be in gaining control of your data across the healthcare enterprise. EHR adoption has done a good job of that with regard to structured clinical data, but the unstructured clinical data (radiology and cardiology DICOM, endoscopy videos, ophthalmology pictures, oncology documents, reports and more) requires similar investment. Investment in and adoption of new technologies is significantly simplified if patient data is consolidated, well managed and easily shared and accessed.

How will healthcare organizations use technology to get consumers more engaged in their care?

Consumers are becoming more and more technology savvy; they're embracing it every day across industries. From depositing checks via mobile phones, to managing driving directions and boarding passes, to managing the ever growing internet of things in the home, office, and on-the-go. Healthcare today is behind the curve in enabling consumers, the patient, to take advantage of technology. I believe we will see this change over the coming years as mobile device platforms build out their

health applications, the mobile app ecosystem grows, and wearables increase in popularity. These solutions either generate or consume data; again for healthcare organizations to be prepared for their adoption, having a strategy for managing healthcare data and the services of that data will be increasingly important.

For many years healthcare organizations have worked to implement technologies such as EHRs. How can organizations now optimize these solutions to actually improve clinical and financial outcomes?

Now that the vast majority of healthcare organizations have consolidated their data within an EHR, we can expect to see the continued rise of analytics make healthcare organizations' clinical and operational staff more efficient and accurate. Don't rely completely on the structured data generally managed and consolidated by the EHR. Unstructured clinical data within diagnostic reports, pixel data from clinical imaging, genomics, and other data sources may hold the real value for improving clinical care and the operational bottom line for healthcare organizations. Healthcare organizations need to have a strategy for consolidating and managing data beyond the EHR alone.

How can healthcare organizations justify investments in new or innovative technologies?

I'm not sure how they cannot. To provide the growing level of care expected, to meet policies and regulations, to drive efficiencies, manage costs, and create new revenue channels, innovative technology is required. Adopting new technology is the cost of doing business and delivering healthcare value.

How can healthcare leaders create an organizational culture that is open to adopting innovative technologies?

Measure and show the value. When adopting innovative technologies, think first about how you are going to measure the results. And when the results start coming in, promote the results. Drive the team on a culture of innovation and passion for delivering results. Take pride in the accomplishments, promote those accomplishments, and hunger for more. ∎

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whether they did or not."

As a result, the clinicians wanted to identify a more definitive means to monitor medication adherence with this particular population. So, in June of 2016, Children's Health became the nation's first pediatric provider to use digitized drugs to monitor medication adherence. With this technology, the medication is encapsulated in a digestible blue-tooth enabled device. Once the patient takes the medication and it hits the gastric acids, a signal is transmitted through a blue-tooth patch that the patient wears on their torso. Clinicians then know exactly when patients are taking their medications and can intervene if necessary.

Medication adherence is not the only care challenge that is being met with technology at Children's Health. Leaders have also implemented programs to address:

Asthma self-management. When physicians noticed that many pediatric patients were coming to the emergency department with asthma related issues, leaders set out to find technologies that might help pediatric patients better manage their condition. They knew that these patients simply needed to stick to an asthma management plan – but realized that a paper-based care management plan would be quickly discarded.

"A teenager, or even a younger child, is not going to review an asthma action plan that is written out on a piece of paper," Perry said. "So we decided to get engagement, we needed to provide them with an app on a smartphone. They can simply pull up the app and know if it is a green day, an orange day or a red day – and immediately know how many puffs they should take on their inhalers."

Access to primary care. An analysis

> **In June of 2016, Children's Health became the nation's first pediatric provider to use digitized drugs to monitor medication adherence...**

data revealed that many children in both rural areas and from some specific zip codes in urban areas were frequenting the emergency department for primary care needs. To remedy this problem, Children's Health worked with school districts in these areas to install video equipment in the schools, making it possible to conduct virtual primary care visits with the students.

Through this initiative, school nurses are equipped with secure, encrypted telemedicine technology, including high-definition, real-time videoconferencing and state-of-the-art digital scopes — connecting students directly to staff pediatricians or nurse practitioners at Children's Health Pediatric Group (CHPG). In addition, through extended mobile technology, parents can connect with providers after hours to discuss their child's virtual visit summary, prescriptions and any other requested information.

"Our motivation is to improve access to convenient primary care for vulnerable children – thereby improving their overall health and well-being, while reducing emergency room visits for non-emergent conditions, decreasing absenteeism for health-related reasons and keeping busy parents at work," said Peter Roberts, president, Population Health and Insurance Services, Children's Health.

SOME HEAVY LIFTING

Identifying technologies that meet specific care needs is just step one. To successfully implement and sustain these programs requires hard work. As such, Children's Health includes the following steps in technology implementations:

Communicate the purpose. "We always make sure that everyone is aware that it is not just about the technology. It's about the fact that providers have identified a specific clinical care need," Perry said.

Train thoroughly. With each program, Children's Health leaders make sure that all clinicians and staff are properly trained to use the new technologies. For example, with the school telehealth initiative, school nurses were trained to use the video equipment as well as the devices and scopes. "We have a competency checklist and we make sure all of the nurses are up to speed," Perry said.

Test the waters. "We pilot all of the programs to make sure that all of the operational pieces are in order and all of the workflows are vetted and tested," Perry said.

Continually fine-tune. After a program has been implemented, leaders continually look for any shortcomings and make necessary improvements.

Ensure financial viability. While it is great to implement technology, Children's Health also does what it takes to make sure all programs are sustainable. For example, when the school based telemedicine program started, Children's Health was only eligible for reimbursement when the child saw his primary care physician of record during a virtual visit. The Children's Health government relations team however, worked with Texas legislature to enact legislation that makes it possible to bill for these virtual visits, regardless of which provider a child sees. ■

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Vlad Friedman, CEO

What do you envision as the most promising healthcare technology innovations poised to emerge over the next five years?

Fundamentally, medicine is based on pattern recognition. Your devices already know a lot about you and your health; your heart rate, blood pressure, activity levels, if you're too stressed, and at risk for diabetes. In the future, even cancer will be detectable just through your breath. I believe that the combination of digital medical information, real time data from IoT devices, AI, and big data and analytics is poised to transform healthcare as we know it.

With so much innovation, how can healthcare leaders prioritize their information technology investments?

The amount of digital healthcare data collected is expanding exponentially. As the technology becomes a pervasive part of our day-to-day experience, a gap and opportunity exists for innovators who can secure PHI while maintaining data availability using scalable design patterns.

Managing data and its access is more complex than ever before. Leveraging external vendors and MSPs to provide services along with tools to manage encryption and data access, especially those that are willing to back up their services with a meaningful BAA and SLA will accelerate innovation.

How will healthcare organizations use technology to get consumers more engaged in their care?

Consumer engagement with care will happen by default as new features are added to wearables. Specialized healthcare IoT devices in combination with wearables like your Apple Watch will wirelessly stream real time data into your own personal health data warehouse. The information will be stored, trended, and analyzed by AI-based applications. These apps are trained to detect patterns used for diagnostics and preventative care. Your profile will be compared with anonymized data from millions of other patients in order to find common patterns to detect and prevent disease in its earliest states.

For many years, healthcare organizations have worked to implement technologies such as EHRs. How can organizations now optimize these solutions to actually improve clinical and financial outcomes?

EHR and digitization of healthcare data is just the first step. The next is to combine EHR data with real time IoT data to track, warehouse, trend, and analyze information in real time. This will change the traditional paradigm from a reactive to a predictive model.

I see the increasing importance leveraging cloud service providers whose investments in security and scalability can help healthcare providers scale and transform efficiently. The value to their patient care and business will be well worth it.

How can healthcare organizations justify investments in new or innovative technologies?

Migrating medical and patient information to the Cloud will continue to be a priority for the healthcare industry. It helps the business of healthcare move from a CAPEX to an OPEX model and this provides the allocation of funds towards innovative technologies to improve the quality and outcomes of care for patients. Healthcare organizations utilize CAPEX savings to invest in new technologies to drive efficiencies and effectiveness. It is the only long term strategy to thrive.

How can healthcare leaders create an organizational culture that is open to adopting innovative technologies?

To transform, we must innovate and to innovate, we must experiment. Healthcare IT leaders should embrace the dynamic nature of the Cloud. The ability to leverage a spin up/spin down infrastructure for non-production workloads encourages experimentation with new technologies.

As systems move to production, evaluate the right fit solution on a per application basis to find each application the right home. Public and private cloud infrastructures can be utilized for efficiency and to address data sovereignty concerns.
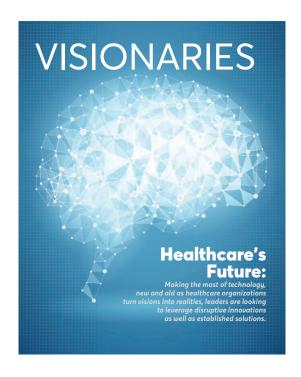
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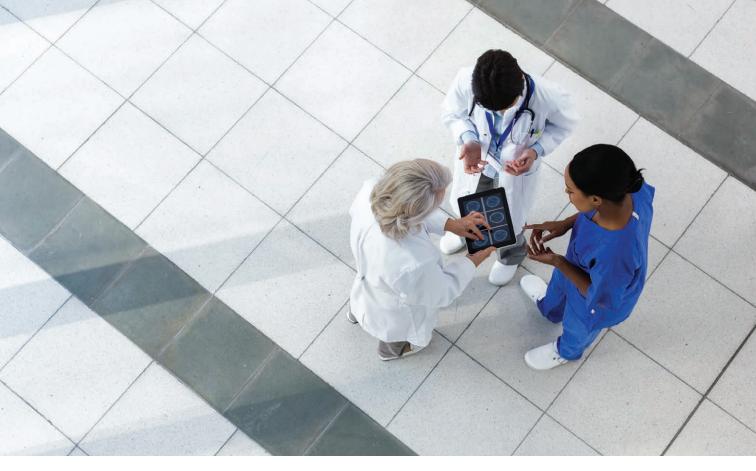
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EHR
DO-OVER?

Providers begin replacing electronic patient record systems.

By Linda Wilson

After a nationwide push to move from paper to electronic patient records, the next phase for some hospitals and physicians is a redo.

As of 2015, nine out of 10 office-based physicians, or 87 percent, had adopted some type of electronic health records system, more than doubling the rate of 42 percent in 2008, according to the Office of the National Coordinator for Health Information Technology. Among non-federal acute-care hospitals, four out of five organizations had adopted a basic EHR with clinician notes by 2015, the ONC reported.

However, a 2015 survey of 277 community hospitals from research firm peer60 found that more than half of those hospitals were unsatisfied with their current EHR, and 20 percent were planning to replace their EHR vendors. Physician frustration with EHRs also has been widely reported.

Replacement "is a common discussion," says Michelle Holmes, principal, ECG Management Consultants. Holmes, who counsels clients involved in replacement projects, adds that many of those who evaluate a possible EHR replacement ultimately decide to optimize or upgrade their current system.

For those who go forward with a replacement, however, Holmes says there are four primary reasons for their decision:

- The system is no longer a good fit after a merger. Executives may opt to consolidate on an existing system or choose a new system to replace it.
- The system isn't performing anymore, either because it can't scale to accommodate growth or the provider's needs exceed its functional capabilities.
- The EHR is being discontinued.
- The vendor has lost credibility with physicians to such an extent that the only way to secure physicians' buy-in for digitizing patient records is to select a new vendor.

For example, Edward-Elmhurst Health was created in 2013 by a merger between two organizations in Chicago's western suburbs—Edward Hospital & Health Services and Elmhurst Memorial Healthcare. At the time of the merger, Edward had just switched its inpatient EHR from Meditech to Epic, while its outpatient operations had been on Epic's software since 2012. At Elmhurst, its physicians also used Epic's system, while its hospital used Meditech's system. Nearby DuPage Medical Group, an independent 560-physician multispecialty practice that admits many of its patients to Edward-Elmhurst, also used Epic's EHR.

That's why the new health system's leadership concluded that consolidating on a system from Epic would not only provide operational efficiencies but also foster a consistent approach to patient care.

As Bobbie Byrne, executive vice president and CIO at Edward-Elmhurst Health, explains, "Having the same EHR system helps us say, 'We are going to practice evidence-based medicine with the very latest information that is built into our records, and we do it regardless of the location that you present for care.' It is about what is the most efficient way to raise the quality of care for everyone."

Without disclosing the total project's cost, Byrne says the health system spent "half as much" to install Epic's EHR at Elmhurst than it had spent at Edward. By the time Elmhurst Hospital switched to Epic, Byrne notes, the data center infrastructure was in place, and her team members were experienced at using the software. "They really know Epic well, and the features and functionality in the system. You can be so much more efficient when you are doing it the second time than when you are doing it the first time," she says, adding that they completed the Elmhurst implementation at 5 percent under budget.

In California, officials at El Camino Hospital—with campuses in Mountain View and Los Gatos—concluded that they wouldn't meet the requirements for meaningful use and value-based care if they stayed with the hospital's legacy best-of-breed configuration. El Camino went live on Epic's EHR, population health and billing systems in November 2015.

"This enables us to meet certain objectives," says Debbi Muro, interim CIO at El Camino, which has a long history with electronic records, and installed its first CPOE system in 1971. "With the new Trump administration, we don't know what will happen to meaningful use and MACRA and some of the other governmental regulations, but [the Epic system] places us in a great position to get the reimbursement we should receive. It also helps with population health initiatives, such as accountable care."

Meanwhile, Adventist Health System, based in Altamonte Springs, Fla., took a different approach. It is replacing ambulatory platforms from four vendors with EHRs and practice management modules and services from athenahealth. But Adventist kept its hospital operations, medical oncologists and physicians involved in the health system's organ transplant program on an EHR from Cerner. Cerner and NextGen Software were among the vendors of the ambulatory EHR systems that Adventist is replacing.

Adventist officials wanted a system that was "purpose built" for the outpatient setting, enabling staff members to become more efficient in patient care and billing operations, explains Jeremy VanWagnen, vice president of physician enterprise, continuing care and research IT systems in Adventist's IT department.

For example, Adventist executives hope to improve the health system's performance in patient portal adoption, fees collected at time of service and lag time in entering charges for claims. Adventist also hopes to decrease the time physicians spend after hours finishing their work in the EHR, explains ECG's Holmes, who is a consultant to the project.

Whatever the reasons, replacing an existing EHR presents many challenges, although IT departments benefit from their earlier experience configuring, deploying and supporting electronic patient records.

"The client organizations have a much better understanding of what works or didn't work both from an implementation and ongoing support perspective," Holmes says, adding that health systems ought to view the replacement project as an opportunity to take a step back and evaluate "all the different things that you could potentially include in a replacement project," including technical and operational factors.

Data migration and integration

One common issue in replacing an EHR is deciding what data to migrate to the new system and what to do with the data that remains in discontinued systems.

When Elmhurst Hospital went live on Epic's EHR on Oct. 1, 2016, its staff had access to four years of data in the new system and read-only access to the older data remaining in Meditech. Byrne says the health system typically converts two years of data, but she went with the longer time span in this case so that the data in Epic would go back to the same date—July 2012—at Elmhurst, Edward and the ambulatory settings. "Otherwise, it is confusing," she says.

At Adventist, which is converting about 1,400 providers in eight states to athenahealth, the project team wanted to minimize the amount of data reentry clinicians would have to do.

Based on feedback from physicians, Adventist decided to move data on patients who had been seen by a provider in the past three years. This data included problem lists, allergies, histories, immunizations, vitals and office notes, as well as data on demographics, insurance and referring physicians.

After concluding that there were too many discrepancies in medication lists among the various EHR platforms, Adventist did not move that data. Instead, providers pull information about patients' recent prescriptions from Sure-

scripts, a technology company that supports data sharing about prescriptions and other medical information. During office visits, providers work with patients to build comprehensive medication lists, using the data from Surescripts as a starting point.

With so many systems remaining from its best-of-breed approach, El Camino Hospital's project team members had hoped to use an archiving solution to consolidate data they did not move to Epic. "We weren't able to achieve the goals that we had hoped—we have stopped that project," Muro says.

Instead, the IT department gave users read-only access to data that they may look at occasionally, such as old lab values, while removing access to data they no longer need, such as data from surgeries that occurred some time ago. In either case, El Camino's IT staff has complied with regulatory requirements about retaining data and also has reduced costs significantly.

Muro expects the hospital to save more than $10 million over five years in total maintenance costs by decreasing the number of production systems and interfaces. Indeed, the IT staff reduced the number of interfaces by 75 percent.

Adventist is going in the opposite direction when it comes to interfaces. Its staff developed a plan for sharing data between Cerner on the inpatient side and athenahealth on the outpatient side.

"We provided a group of interfaces for those feature functions that were appropriate and safe, and would be used on an ongoing basis by the providers," VanWagnen says. Adventist created bidirectional data sharing for many data elements, such as lab and radiology orders and results or demographic data—but not for everything. For example, surgeons cannot pull up automatically in the hospital's EHR patients' history and physical data that they had already documented in the ambulatory system.

"There are lots of things that are very

"We are excited about the next phase of work—but it is a journey."

—Jeremy VanWagnen

much not ideal," VanWagnen says. "We need to work with our vendors to go do that next phase of work. We are excited about it—drawing the systems closer to each other to help with safe and efficient care—but it is a journey."

Communication, training and support

Technology issues aren't the only hurdles to overcome. Communication and change management also require careful planning and execution. "I am a big advocate in projects like this of actually engaging the organization's marketing and communications department to help with that," Holmes says.

Adventist took her advice. VanWagnen says Adventist's corporate marketing team has been involved in the project from the beginning and helped create a multifaceted approach to communication and change management, including a project title, "Operation Athena," and logo.

VanWagnen and a team also traveled to every medical group over a two-month period to talk about the decision-making and implementation processes. The team also bought and rebranded an event-management app, enabling users to respond to surveys, post pictures and comments, and review schedules and documents. Adventist provided users with desktop and smartphone versions of the software. "It was one of the primary vehicles to both talk and listen and take the temperature out in the user base by surveying on a regular basis," VanWagnen says.

Despite meticulous preparation before replacing an EHR, training and support issues crop up after a go-live date.

Muro says the El Camino's IT depart-

ment underestimated training costs by about 20 percent, but it recouped the cost overrun because the entire project came in under budget. She says the department miscalculated the amount of time nurses would spend practicing in the test environment before the go-live date and how many employees would use overtime hours to attend training sessions.

El Camino's IT staff also realized quickly that clinicians needed additional coaching to help them make decisions about what external data they should incorporate into patients' records at El Camino. In less than 12 months, the hospital shared 2 million records with organizations in 43 states that had an EHR from Epic.

"We had to stop and train our users in how to bring in the relevant data," Muro says. "That was an aha moment."

Adventist's "Operation Athena" team has been tweaking the process continuously as it rolls out the ambulatory system in six waves. It is scheduled to complete the implementation this year.

For example, during the first wave, some users couldn't access the information they needed to do their jobs because they didn't have the correct security position. For the second wave, VanWagnen explains, "We did a better job communicating what our security positions were, and what they would be able to do, and how those related to their previous positions." Adventist also made sure users logged into the system before their go-live dates to see exactly what information they'd be able to access.

"We learned a lot after the first wave about training and support, preactivation prep, testing, and what it takes to support the application," he says. ∎

SECURITY & PRIVACY

Protecting Data in the Information Sharing Era

As information technology becomes more prevalent in healthcare, providers, payers and patients are navigating plenty of promise – and plenty of peril.

A report from Black Book, a market research firm based in Tampa, Fla., sheds light on the both sides of this information technology coin. "In this age of healthcare consumerism people want to receive care through technologically enabled alternatives like telemedicine visits, secure email communications with their practitioner, and access to records and scheduling," the report authors wrote.

However, according to the firm's survey of more than 12,000 consumers, 57% of consumers are skeptical of the overall benefits of technologies such as patient portals, mobile apps and electronic health records (EHRs) mainly because of recently reported data hacking as well as a perceived lack of privacy protection. In fact, the survey found that as the amount of available health data is increasing so too is the hesitancy for consumers to share that information due to industry privacy and security issues. The unwillingness of patients to comprehensively divulge all their medical information rose to 87% in the fourth quarter of 2016. Consumers specifically expressed that their pharmacy (90%), mental health (99%)

In this age of healthcare consumerism people want to receive care through technologically-enabled alternatives...

and chronic condition (81%) data might be shared with retailers, employers or the government without their consent. At the same time, 93% of respondents believe the security of their personal financial information could be at risk, given the fact that high-deductible Affordable Care Act plans and co-pays have resulted in the need to share banking and credit card data.

Certainly, such consumer concerns are not unfounded. Consider the following: 80% of providers in 2016 admitted that their organization had experienced a recent "significant security incident", according to responses from the 183 healthcare leaders who participated in the *2016 HIMSS Cyber Security Survey.* Governmental leaders are also worried about data breaches as a report examining the benefits and challenges of the Internet of Things from a bipartisan Congressional workgroup released in early January points to cybersecurity and privacy as top concerns across a variety of industries.

The problem in healthcare, however, is the fact that organizations have rushed to implement data sharing technologies but have neglected to keep up with security controls. "During the past five years, primarily because the government has mandated and prompted it, hospitals and physician practices have adopted electronic medical records. While these organizations have acquired the technologies to collect and distribute patient data, the focus on security has not been there. So, we are still coming across large institutions that have not protected data adequately," says Sanjay Deo, president and founder of 24By7Security, Inc., a cybersecurity consulting firm based in Coral Springs, Fla.

The good news is that a variety of technologies are available to healthcare organizations including artificial intelligence, block chain, encryption, compliance tracking, identity management and others to protect patient data. However, according to the HIMSS report, healthcare organizations tend to only use a limited number of these solutions. For example, while 86% of provider organization use antivirus/malware, 80.7 % use firewalls and 64%

use data encryption only 39.3% use multi-factor authentication, 37.3% use a messaging security gateway and 36% use data loss prevention applications.

While security technologies can offer healthcare organizations protection, leaders can't just implement these solutions in a silo but must instead develop comprehensive cyber-risk management plans that address security processes and staff training as well, according to Kevin Hyde, managing director of cybersecurity consulting firm Layer 8 Security, Exton, Pa. These plans must stretch far beyond the auspices of federal privacy standards according to Hyde, a former U.S. Marine Corps intelligence officer who has worked for the National Security Agency.

"HIPAA is a minimum standard," Hyde says. "It should not be a security standard you aspire to. Instead organizations should be looking to comply with comprehensive security frameworks such as the cybersecurity framework, proposed by the National Institute of Standards and Technology."

In addition, organizational leaders need to look beyond a "one and done" approach – and leverage multiple technologies to secure data and protect patient privacy. "Healthcare organizations need to layer in all kinds of technology from firewalls to endpoint protection to antivirus to multi-factor authentication. All these solutions need to be layered on top of each other to offer the right amount of protection," Hyde says.

Healthcare leaders also should consider the "human layer" and ensure that they have the right technology training in place as well as the "policy layer" to ensure that they have the correct security processes in place. Perhaps even more important, organizational leaders need to ensure that they consider their entire ecosystem when addressing security concerns.

"When hospitals use third party vendors, for example, their attack surface expands. So, they become more vulnerable. Leaders, therefore, need to consider their entire footprint when implementing security solutions," Hyde says. ■

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David Ting, CTO & Founder, Imprivata

What are the most pressing data security issues facing the healthcare industry today?

In 2015 it was all about Data breaches as some 115M patient records were stolen. In 2016 it was about ransom-ware and the ability for an easily downloaded malware to disable an organization's use of either a single user's machine or an entire system. Data security challenges continue as patient data represents value with a much longer shelf life than credit information and can be exploited for 10-50X more than a stolen credit card. HIPAA provides a focus on protecting the privacy of patient data but as we know, privacy does not equate to cybersecurity, and the rapid conversion of medical information from paper charts to electronic data leaves organizations unprepared for the increasing attacks.

The Verizon 2016 breach report cites healthcare as being the most targeted sector, with increasingly more sophisticated actors. There is an escalation in the sophistication of attacks as actors are now becoming nation states instead of amateurs or hactivists.

How can healthcare organizations proactively protect patient data?

There is no single approach to protecting patient data. As noted above, privacy does not equate to security and the need exists for organizations to look at cybersecurity risks in a holistic manner. NIST (National Institute of Standards and Technology) has defined the Cybersecurity Framework as a means to standardize how an organization should approach cybersecurity. The approach is to not solely focus on defensive measures to keep out attackers but also to address cyber resilience and the ability to detect, respond and recover from an attack. This thinking changes the strategy from a purely defensive approach to one that addresses the ability to recover from a successful attack.

What technologies can healthcare organizations leverage to more successfully protect patient data?

There is no one single technology that can be used, as multiple layers of defenses are needed. The consensus in healthcare is that large security gaps can be closed down by using strong authentication for computer access, especially through remote access and the elimination of knowledge based authentication such as passwords, which can be easily stolen online through sophisticated phishing or social engineering attacks. The rationale behind this approach is rooted in the fact that people are the fundamental cause of 80-90% of all breaches; eliminating an authentication factor that can be stolen online dramatically lowers the risk of a breach.
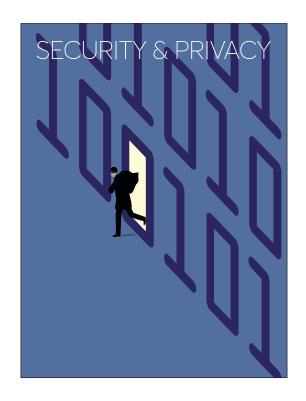
As healthcare organizations store more data electronically, access to this information becomes increasingly important. How can organizations best balance the need to provide access to patient data with the need to protect it?

With the rapid consumerization of healthcare, patients want increased control over how they interact with healthcare organizations when it comes to dealing with health issues. This increased drive to offer patients access to their medical records, subscriptions, schedules, messages, etc. will require organizations to manage access requirements with similar, if not more stringent, requirements as for providers. Privacy breaches for patient records inadequately secured by the patient is still a HIPAA violation. This places even greater responsibility on healthcare organizations to provide adequate access policies, strong authentication and audits for consumer/patient facing services such as portals or messaging. ∎

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The financial importance of gender diversity in the executive ranks and on corporate boards is becoming more apparent in the public consciousness every year, but the percentage of women who hold leadership positions in healthcare IT remains stubbornly low. In 2017, the editorial staff at *HDM* will again showcase the exceptional achievements of this under-represented group to the entire industry, raising the profile of the selected executives and the importance of diversity.

In coordination with these new rankings, which recognize C-level executives, HIT leaders, and industry thought leaders, *HealthData Management* hosts the annual **Most Powerful Women in Healthcare IT** program. This one-day event honors the award winners and offers professional development, mentoring and networking time for women in the industry.

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GETTING TO THE
BOTTOM LINE

Telling consumers the cost of care is harder than it sounds.

By Maggie Van Dyke

I t sounds logical: To turn patients into engaged healthcare shoppers, give them estimates of their out-of-pocket costs and show them how prices vary from provider to provider.

Proponents believe transparency efforts will save patients money, level price variation across providers through increased competition, and lower U.S. healthcare costs. Over the past decade, a variety of stakeholders, including insurers, employers, hospitals, states and not-for-profits, have launched tools designed to give consumers price information.

But the success of these undertakings varies widely, depending on the tool and engagement approach used. Among disappointing findings, only 3.5 percent of eligible Aetna members used the insurer's member payment estimator between 2011 and 2012, according to a 2016 *Health Affairs* study. And as described in a 2016 *JAMA* study, healthcare spending rose among employees given access to a pricing tool.

Yet, these results contrast sharply with other more promising findings. A 2014 *JAMA* study of 18 employers found that medical spending decreased after employees were given a price transparency tool, particularly for imaging and lab tests. Another tool saved one employer $1.1 million in claims, according to another report.

In technology terms, price transparency is still in beta testing.

"It's still a journey," says Richard L. Gundling, senior vice president, healthcare financial practices, at the Healthcare Financial Management Association (HFMA). "We're still trying to understand how patients want to use price transparency tools to help them make better decisions. And

patients are still getting used to asking about the price of their healthcare."

As healthcare IT leaders develop, adapt or purchase next-generation pricing tools, lessons learned by transparency pioneers can provide valuable guidance.

Is everything shoppable?

"In the middle of a heart attack, I'm not going to pull out my iPad and tell the ambulance driver to slow down so I can do some price research," says David Newman, executive director of the Health Care Cost Institute (HCCI).

In other words, shopping that is detrimental to a patient's health should be discouraged. That's why price transparency tools focus on shoppable services, which are primarily common services that can be scheduled in advance, such as mammograms and total joint replacements.

These shoppable services make up as much as 43 percent of what consumers purchase, according to an HCCI study on individuals with employer-sponsored insurance. Within this 43 percent, more shopping is possible around outpatient and physician services than inpatient services.

Even though a sizable percentage of healthcare services are shoppable, Newman is skeptical that consumer shopping can move the needle on healthcare costs. "Patients only have control over their co-pays, deductibles and coinsurance," says Newman. Taking that into account, he estimates that about 3 percent of the total U.S. healthcare spend is impacted by patients' shopping choices.

Even so, cost reduction is only one goal among many cited by healthcare stakeholders launching price transparency tools. For many hospitals and physician offices giving price estimates, it's about taking the surprise out of a healthcare transaction, HFMA's Gundling says. "There's nothing that dissatisfies a patient more than to get a bill for $2,500 that they were not expecting."

And a dissatisfying medical billing ex-

perience could result in a loss of patients and revenues. According to the 2014 Connance Consumer Impact Study, 95 percent of respondents who were highly satisfied with their billing experience

would return to the same hospital for an elective service. In comparison, only 58 percent with less-than-satisfactory experiences would remain loyal. The same survey found that satisfied patients were more likely to pay their medical bills than unsatisfied patients.

Payers data

"Patients consider 'price' to be what their out-of-pocket responsibilities are," Gundling says. "After all the insurance and government payments happen, what do I owe?"

An insured patient's financial responsibility will vary depending on insurance benefits and the contract rate the insurer has negotiated with a particular provider. As Newman explains: "It's easy for United Healthcare to say, 'This is your price with your insurance at this hospital.' But if you go to a hospital and ask, 'What's your price for a normal vaginal delivery?' they'll say, 'I have 10 prices, because we contract with nine insurers and we have a price for uninsured patients.'"

That's why HFMA believes health plans are best poised to give members price estimates, as summed up in a report from the association's Price Transparency Task Force.

Most major insurers have stepped up to the plate for their members. For instance, 18 months ago, Priority Health launched a cost estimate tool that enables members to see what their out-of-pocket costs would

be for more than 300 services and how those costs vary across providers.

What if patients don't have insurance? HFMA recommends that uninsured patients turn to their providers for price es-

"A lot of physicians are uncomfortable at first having these conversations."

—Richard Gundling

timates, as well as help obtaining potential coverage or charity discounts.

There is also a growing number of public-facing websites that can give patients a fair idea of what common health services cost, often searchable by ZIP code or location. These include state-mandated all-payer databases, such as Colorado's Medical Price Compare. A number of companies and nonprofits also have free online tools, such as HCCI's Guroo.

Quality matters, too

Like many pricing tools provided by insurers and employers, the Priority Health transparency tool also gives each provider a rating of 1 to 5 for overall quality. This is important in healthcare shopping, Gundling explains. "We don't buy anything just based on price," he says. "Hospital A may be more expensive, but I'm still going to go there because I trust it. All my friends go there. To be more comfortable is worth $100 for me."

The evolution of Castlight Health's platform for employers and insurers helps illustrate how thinking about transparency is evolving. "We started out being very much about price transparency," says Kristin Torres Mowat, senior vice president, plan development and data operations for Castlight. "Now we've expanded to be about managing benefits more broadly."

The Castlight Health platform enables employees to compare prices and quality across healthcare providers for specif-

To Avoid Bill Surprises, Integris Estimates Patients' Out-of-Pocket Costs

INTEGRIS HEALTH WAS ONE OF THE first health systems to adopt a price-estimate tool that gives patients a quote on their expected out-of-pocket costs. One reason the Oklahoma-based network launched the tool back in 2010 was to save patients from medical billing surprises.

"One of the worst phone calls I get is from a patient who has a big liability and says, 'If I had only known it was going to cost this much, there is no way I would have had this procedure done,' " says Amber Harris, administrative director for patient access.

In addition to looking out for patients' financial health, Integris Health saw an opportunity to improve point-of-service collections, or arranging for patients to pay their portion of the bill before they leave the hospital or medical office, Harris says. "We wanted to make sure we were giving patients a viable estimate so they could, hopefully, make arrangements to pay that prior to service so we have reduced billing costs."

Harris estimates that Integris has improved point-of-service collections by at least 50 percent since 2010.

Following the lead of Integris Health and other transparency pioneers, 88 percent of healthcare providers now provide price estimates at the time of service, according to a 2016 Navicure survey of 300 providers.

Fueling the trend is the rising number of patients covered by high-deductible health plans, which require enrollees to pay a higher share of their medical bills. This leaves providers at risk for the amount patients don't pay.

Some hospitals and health systems, like Billings Clinic, based in Billings, Mont., and St. Clair Hospital, headquartered in Pittsburgh, have patient-facing tools on their websites that enable patients to enter their insurance information and get online estimates for the most common procedures. For now, Integris' pricing tool is used behind-the-scenes by registration staff who give patients an estimate before every scheduled service, from MRI to total hip replacement.

"Prior to having a pricing tool, we were giving patients a very broad idea of their responsibility. The best we could say was, 'We know you have to pay your deductible,' " Harris says.

Now, registrars can calculate a specific estimate of the patient's out-of-pocket responsibility by entering several pieces of information into the application, beginning with the patient's insurance plan and the procedure code (i.e., CPT code) for the service that the patient will receive.

Behind the scenes, the solution sorts through the contract that the health system negotiated with the patient's insurer to determine the price of the service under the patient's plan. "The estimate has to be based on the contract that is applicable to that patient," Harris stresses. "The tool needs to have an easy way for patients to access staff to pick the insurance plan based on the patient's benefit card. Then it needs to map that plan to the right contract.

"The cleanest estimate you can do is to have a CPT code and go out and see if that CPT code is grouped somehow in the contract with a specific reimbursement rate," Harris adds. "As long as you are getting it directly from data you've established with the payer and you've modeled your contract correctly, that's the most direct way."

In contrast, a provider's chargemaster—a list of rates for various services—is typically irrelevant, says Harris. That's because chargemasters cite general prices, not the actual rates negotiated with commercial insurers or the set fees paid by Medicare and Medicaid.

Yet, even tying price estimates to contracts may not be 100 percent accurate, warns Harris.

"Even with excellent contract modeling capability in a pricing tool, there are still nuances of contracts sometimes that are just hard to model, she explains. Certain contracts might put certain procedures together into groupings that have some special logic to them. So you have to figure out a way for the tool to allow for as many contract terms as possible, and hit it as close as you can."

To complete the price estimate, Integris' tool factors in the patient's specific benefit information, such as the dollars patients must pay to reach their deductibles and the co-insurance percentage that kicks in after the deductible is met. This part of the estimate is less automated than Harris would like. "It's not a requirement in the HIPAA 270/271 transaction. That data set is somewhat limited."

Some insurers electronically calculate and share the specific data points needed for price estimates. But in many cases, Integris registrars must sift through the insurer's eligibility response to find these data points and enter them into the price estimate tool.

Integris is in the middle of transitioning price estimate tools, from TransUnion clearIQ to Experian Passport, because of a systemwide switch to an Epic electronic health record and Experian revenue cycle suite. "We're trying to streamline the different number of vendors that we use so it made sense to try to use a tool from the same vendor," Harris says.

The switch has drawn attention to the importance of usability in price estimate tools. "We really helped develop part of our legacy tool. We made modifications to make it a relatively user-friendly tool. Now, we're going through growing pains with our new tool. We're working to make sure that the new tool we're using is as reliable as the old one."

When asked what's important for IT leaders to consider when building or adapting a price estimate tool for hospital revenue cycle staff, Harris says: "The simpler the screen the better."-*M.V.*

now employees can also find information about all the health-related benefits their employer offers from employee assistance programs and telemedicine to dental and mental health benefits. All this informa-

searches for a behavioral health therapist, for example, the platform provides information on the employer's EAP and explains that the first four visits are covered under the EAP.

formation by calculating, for example, how much of an employee's deductible has been met, and explaining benefit terms in easy-to-understand language.

To help explain why Castlight Health

MICHIGAN'S PRIORITY HEALTH, A nonprofit health plan, launched a price estimate tool 18 months ago as part of an overarching effort to engage members in their healthcare.

"Evidence shows that consumers who are engaged in their healthcare have better outcomes," says Krischa Winright, CIO. "We're passionate about transparency because we believe it helps consumers get more engaged in their healthcare. Consumers are bearing more and more of the cost, which is driving them to be more and more interested in getting engaged and driving their own healthcare decisions."

Priority Health members can search the health plan's Cost Estimator online or via a mobile app to find the price of more than 300 procedures and services, from mammograms to hip replacements, at their provider of choice. The tool also calculates the member's specific out-of-pocket responsibility (for example, any remaining deductible owed and co-insurance).

If a provider's price is higher than fair market price, the tool pulls up providers that offer the service for less. To help members make a choice, the tool gives each provider an overall quality score. Members can also see how far they would need to drive to get to different providers.

To further incentivize members to choose less costly providers, Priority Health is giving cash rewards of $50 to $200 to members who choose providers that offer a service below the fair market price.

"We have tens of thousands of users every month using the tool and saw an uptick in users in 2016," Winright says.

Priority Health is well-positioned to be the source of truth for its members on healthcare prices. As a health plan, the organization has access to current contract prices it has negotiated with various providers as well as the details about each member's health benefits.

A member has only to log in to the Priority Health member portal or mobile app where the Cost Estimator is stored.

Then the tool integrates data from various systems before calculating the member's out-of-pocket responsibility. "When members authenticate within our environment, we already know what benefit plans they have, which helps us provide a personalized price estimate," Winright says.

In comparison, many public-facing pricing tools give consumers a price range for an estimate based on historical claims obtained from various payers because they do not have access to each insurer's contracted rates and the member's benefit specifics. When Priority Health staff compared public-facing cost estimators on the market, they found that price estimates varied up to 100 percent to the actual price the consumer paid.

"Can you imagine putting something in your grocery cart that is priced between $5 and $100? And then you get to the cash register and it's $300," Winright says. "That's the reality of what people are experiencing in healthcare, and we felt consumers deserve something much better."-*M.V.*

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expanded its solution, Torres Mowat points to statistics like this one—73 percent of employees don't understand their benefits, according to AFLAC.

"Benefits are complex, and we typically need information about our benefits when we're sick or a family member is sick, and that's not usually a time when we're going to try and understand how our benefits work," Torres Mowat says. "Ultimately, we believe we need to engage people in their benefits at the time they need care so they can make the best decision."

Build it first

Thoughtful push-pull strategies can help encourage more patients to use pricing and benefit tools or consider price when shopping for services.

One insurer saved $220 per MRI after outreach staff telephoned members to let them know that MRI prices varied, particularly between hospital-based and free-standing facilities. As detailed in a 2014

Health Affairs study, member use of hospital-based facilities decreased by 7 percentage points in two years. The initiative also appears to have spurred price competition, given that variation in MRI prices across hospital-based and freestanding providers declined by 30 percent.

Within the Castlight Health solution, employees can sign up to receive money-saving and health-saving tips, Torres Mowat says. For instance, if an employee goes to the emergency room for a non-emergency, such as a headache, then that employee might receive a note in her employee benefit portal that says something like, "Here's your claim from your emergency room visit. Did you know that you save X dollars by going to an urgent care center in non-emergency situations instead of an emergency department?"

Given privacy considerations, Castlight is careful to only push out notifications that employers agree to send and employees agree to receive, Torres Mowat adds.

Include the physician

The patient's physician is a crucial person often missing from price discussions, says Gundling: "A lot of clinicians are uncomfortable at first having these conversations because they don't want the patient to think that money is getting in the way of their care. But patients say these discussions empower them."

In an ideal scenario, physicians or their staff would have easy access during a meeting with a patient (for example, via mobile devices) to information on a patient's insurance benefits and out-of-network costs.

Says Gundling: "If the physician said, 'Rick, you're going to need knee surgery and it's going to be $2,500 out-of-pocket for you,' it gives me a chance to say, 'You know, I don't have $2,500. Can we wait a few months so I can save up? Or is there an alternative to surgery?' Then the physician might say, 'Maybe we could try this drug treatment first.'" ∎

PROVIDERS
FIGHT BACK

Healthcare organizations get proactive to defend their data.

By Joseph Goedert

Healthcare providers and payers have been confronting cyber attacks for several years, and there are no indications the threat environment will get any better in 2017. But as hackers step up the pressure by constantly creating new forms of malware, providers are fighting back.

Organizations, such as Henry Ford Health System, Barnabas Health, Sentara Healthcare and others, are doubling down on efforts to improve network defenses, raise awareness about the methods hackers use and employ analytics to detect anomalies in network traffic.

For example, Henry Ford Health System, with six hospitals serving metro Detroit and the city of Jackson, Mich., has redoubled efforts to monitor firewalls, outbound traffic and inbound logins, including the successes and failures of those logins, according to John Fowler, deputy information security officer.

A failed login, particularly a string of failures, could mean a legitimate user forgot the password, or it could indicate real or attempted compromise. But successful logins also can be suspicious, such as a user logging in at one location, then logging

in again at another location. That, Fowler says, could be a compromise or indication that the user knowingly shared a password with someone else. Either way, these scenarios and others should be treated as early indicators of possible compromise and investigated.

Henry Ford also is using data loss prevention software to assess information leaving the organization so only authorized data that also complies with various state and federal regulations is released.

"Data loss prevention is becoming a major part of our security protection," Fowler notes. "The software also can assign confidential levels to specific individuals so only those absolutely needing to see the data can see it."

Doing homework

Experienced hackers take time to study an organization and figure out how best to get in before making their move, says Hussein Syed, CISO at nine-hospital Barnabas Health serving New Jersey. That means providers need to do their own homework by assessing vulnerabilities and implementing protective measures.

Barnabas is changing its security culture by requiring two-factor authentication for all remote users with no exceptions, so if malware is on a computer and a hacker has a username and password, data can't be accessed because of the additional authentication required, Syed explains. Two-factor authentication could be a biometric scan or a randomly generated PIN that lasts for only 30 seconds.

Barnabas Health also is using "privileged account management," under which employees with higher access levels also need stronger authentication, such as a key card for an additional authentication step. "These fortify security beyond baselines," Syed says.

The organization also monitors computers—conducting computer audits—to ensure no one is copying the database or making unapproved changes. Further, some technicians are working full- or part-time looking through network environments to detect abnormal activities, including employees who may be getting less vigilant about security.

Healthcare organizations also must, to the degree they can, conduct their own forensics to take the malware they find, examine it and assess its implications and the actions that should be taken, Syed advises. "Once a hacker has complete control, that's when you have problems."

Inexpensive and open source forensics are available, he notes; the problem is finding the technical resources to appropriately use forensic technologies. "Hiring and retraining forensic professionals is difficult," he adds. "Compensation plays a big role, as financial companies can pay much higher than healthcare. Good security pros get approached weekly."

Syed suggests hospitals bring in security interns, train them and hope they stay for a while. He's working with the Barnabas human resources department on hiring and training interns, "and leverage their expertise and eagerness to learn to my advantage."

Finding a balance

A major challenge for health organizations for many years, now exacerbated as the threat environment has significantly increased, is to find the right level and mixture of security without unduly imposing new burdens on those who use information technology.

While restricting access to data is part of Henry Ford's security posture, so also is making it easier to share data to ensure business functions are not impeded. A cloud storage platform can support information sharing among authorized users and should be encouraged via a corporate-supplied cloud, Fowler says. Those needing such services and not getting them will go and find their own cloud services to get around the restrictions, he warns. "They're just trying to get their jobs done."

In a major new initiative, Henry Ford now has a full-time forensic analyst on

staff, a position that Fowler says is not yet common in the industry. Most organizations adopting forensics outsource this function, "but their vendor is paying attention to us and other clients, and at a cost," he adds.

The delivery system further belongs to several collaborative organizations that include the National Health Information Sharing and Analysis Center, Michigan Healthcare Cybersecurity Council and the CISO Coalition, an invitation-only program to share information in a safe environment "to see the threats coming before we get hit," Fowler says.

Malware everywhere

With a little technical knowledge it is easy to become a hacker. The Dark Web, a subset of the Internet, is a malware marketplace enabling hackers to remain anonymous. Malware, says Daniel Bowden, vice president and CISO at Virginia-based Sentara Healthcare, can be easily purchased on the Dark Web and then easily find its way to you.

Most malware is not new; it often is older software that someone else wrote. It's bought by a hacker, who then can tweak it for a specific purpose, he explains.

It is imperative, he contends, that healthcare organizations engage in cyber threat information sharing programs to identify indicators of compromise "so you can block that host before it gets to you."

Sentara Healthcare participates in national, healthcare-specific and Virginia-based threat sharing initiatives, and interactions with these entities happen throughout each day, Bowden notes. "If someone in your forum finds a threat, they publish it so you can see if you already are

"Once a hacker has complete control, that's when you have problems."

—Hussein Syed

Ransomware, malware are hackers' top exploits

When it comes to cybersecurity, health-care organizations are most concerned about social engineering, data theft and internal threats. And they perceive ransomware and malware as the top ways that cyber criminals are exploiting their weaknesses.

Those are among the findings of a survey of nearly 200 members of the Association for Executives in Healthcare Information Security and College of Healthcare Information Management Executives.

In the survey, the top-ranked potential security vulnerabilities that worry AEHIS and CHIME members are data exposure, security misconfiguration and poor authentication/session management. However, they indicated that the most common security threats to their organizations are social engineering, insider threats and the Internet of Things.

Asked how their organizations would

perform if systems or data were compromised by a targeted attack compared with a year ago, survey respondents said they are now better prepared for a security incident by having systems in place. In addition, they contend that their capabilities for discovering a security incident and recovering from it are currently better compared with a year ago.

Avi Rubin, director of the Health and Medical Security Lab at Johns Hopkins University, says there were no surprises in the results of the survey and that they were exactly what he would have expected.

CHIME Vice President for Federal Affairs Mari Savickis presented the survey findings to the Department of Health and Human Services' Cybersecurity Task Force, mandated by Congress to develop recommendations to counter the healthcare industry's growing cyber threats putting patient information at risk.

hit with it."

He advises also not just having software programs that filter or block malicious activities, but technology to determine if filters actually block the malware. And additional double-checks are available. "When we get shared feeds from the forum, we might find that Cisco already blocked something you already blocked."

There is never an opportunity to take a break, Bowden warns. "The business is always changing and data is always organically growing, so you need to constantly reset your capabilities, reviewing and re-evaluating how quick to recover if hit via data backups, recovery of snapshotted data or tapes."

In the past year, Sentara has invested in a security operations center that in-

cludes logging tools that will show brute force attacks, phished credentials, untypical user behavior or a signature hit of specific malware.

But above all, a robust cybersecurity training program is a bulwark of protection. Sentara conducts annual training of 28,000 staff members as well as nonemployed providers and others with access to information systems; the training is conducted in stages throughout the year.

The training program includes mock attacks on employees and others to identify those who made a mistake and need a security reminder. If someone clicks on a link they should not have, they are directed to a site that tells them they would have fallen prey to an attacker, and are told what the specific error was.

Phishing exercises are not just for large provider organizations; smaller ones need to do their best based on resources to always keep security top of mind, Bowman cautions. "If they have the right skill sets, smaller hospitals can write their phishing training programs and not have to buy a tool to deliver the campaign." ∎

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Interview by Fred Bazzoli

A career reboot in healthcare

When you spend 39 years working for one company, you tend to think you'll stay there for the rest of your career. That's what Gil Hoffman thought. Then he got a call from a recruiter, who asked Hoffman, then senior vice president and CIO at Maritz Holdings, to at least listen to a pitch about Mercy. "I started thinking about my career and realized I had overcome most of the challenges I was going to face." Coming to Mercy in 2012, he found he could apply IT to match challenges that already had been met in other industries but not yet in healthcare. His efforts were rewarded when Mercy won a 2016 HIMSS Enterprise Davies Award.

On making the switch to healthcare
The first 90 days, I was just lost. Then I started to focus on the problems people were trying to solve. I figured if they could articulate a problem, I could apply IT to solve it. It gave me a new opportunity to learn about healthcare and bring almost four decades of IT experience to solve problems.

On the impact of analytics
Healthcare has generated a ton of data, but we weren't using it to its fullest potential. We had yet to ingrain that data in daily operations to have the ability to make immediate decisions based on it. It

was an opportunity to leverage my experience and take lessons from other industries that have been doing it for a while, and that helped accelerate some of the things we're doing now with analytics.

On helping other organizations with IT
It's part of the ministry vision of Mercy. We look to share our expertise to help others provide better healthcare. It allows us to help the greater healthcare community while extending a mission of excellent care to more patients. We were asked over two years ago by Epic to install a system for one provider. We did that, it was a great success, and the phone keeps ringing because providers need proven health IT services more than ever in a value-based world. Today, we've deployed and host Epic for more than 50 hospitals, we're providing data analytics and helping others optimize their systems. Our IT staff is very proud of what they do, and it takes the bull's-eye off our back of only being an expense center for Mercy.

On the potential of technology
Mercy Virtual, our new virtual care center, uses technology for complete patient-centric care. We can reach out and serve rural communities, monitor patients at home and provide specialists to assist other hospitals through telemedicine, for example. We're also finding ways to make real-time information the new norm. ∎

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