



## Patient-Centered Care: Building the Connected Healthcare Enterprise

### CIOs and Health IT Leaders Talk Integration, Interoperability and Images

#### INTRODUCTION

Clinical studies have long proven that patient-centered care reduces variability, improves quality in clinical practice and patient outcomes and reduces cost. This is the shared goal of healthcare's Triple Aim: Simultaneously improving the health of the population, enhancing the experience and outcomes of the patient, and reducing per capita cost of care for the benefit of communities. Information, knowledge and insight sit at the center of improving care. But despite great need to achieve patient-centered care, there still is great want as many healthcare systems are falling short of achieving it. Some information systems are disparate, lack interoperability and integration. Healthcare CIOs and clinical IT leaders together with the healthcare industry play a key role as the technology innovators and enablers linking together people and processes for better care coordination. This white paper focuses on their 2015 priorities and initiatives to achieve high-quality, high-touch connected care with improvements in outcomes and reductions in cost. It includes insight from four healthcare IT leaders and four distinct case studies on their institutions. The experts include John Foley, CIO of University Hospitals in Cleveland; Arlyn Broekhuis, CIO of Sanford Health the Dakotas of the U.S.; Gene Thomas, CIO of Memorial Hospital in Gulfport, Miss.; and Lynda Womack RT(R), the executive director of imaging services at John Muir Health in northern California.

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#### HOW TO THRIVE IN HEALTHCARE TODAY

A variety of factors are converging. They include patients, caregivers and health systems. Patients are increasingly dealing with multiple health conditions and receiving care at multiple locations from multiple providers, creating the need for sharing medical and financial records across myriad disparate systems, data sources and devices. Physicians and caregivers must work together in teams to offer insight, supported by interoperable and integrated information systems within the structure of the health system that speed access to a complete patient record. CIOs and clinical IT leaders are focused on facilitating the availability of data to whoever needs it. To thrive in healthcare today, health systems must focus on data access and sharing.

Well-orchestrated care is not accomplished, however, just by deploying IT systems. Integration, interoperability and adoption are essential. Facilities must embrace change management and the drive to thrive in this new healthcare paradigm. Patient-centered care depends on aggregating all the data for comprehensive patient records. Implementing an EMR is not patient-centered until it strengthens the patient-clinician relationship, promotes fruitful communication, helps patients learn more about their health, and facilitates their involvement in their own care.

Making the equation more difficult is the fact that CIOs, like other members of the healthcare leadership team, are faced with shrinking IT-related spending budgets. They also toil to unite IT systems as facilities, clinics and offices are purchased and consolidated into a larger health system. Strategies must work top down and bottom up. The EMR, for example, is the repository of all patient data across the enterprise. Yet, department and specialty specific systems such as multi-ology PACS must integrate smoothly with the EMR to open access to vital patient data and images that facilitate

patient care from diagnosis through treatment monitoring. To support patient-centered care, our CIOs and health IT experts say we must equip multidisciplinary teams with anywhere access to enterprisewide patient data and images via a multi-'ology PACS linked to an EMR and perhaps a healthcare image exchange (HIE). Universal access to data and images also is being unlocked by vendor neutral archives (VNAs), freeing facilities of proprietary and limiting formats.

Progressive health systems and health IT leaders, such as the ones you will learn from here, are amassing a strong infrastructure and interoperable foundation to make systems, tools and people work in harmony. With this structure in place, providers can proactively intervene and dramatically improve the health and well-being of the people they serve. The health system also can remain fiscally flexible and fit.

## **CIO PRIORITIES: CONNECTED HEALTHCARE**

It has been said that every health system is different; unique in strengths and structure. But as healthcare evolves, the similarities are building and converging. Facilities are achieving economies of scale and embracing new national healthcare directives such as the Accountable Care Act in the U.S. Health systems across the globe are striving to achieve the Triple Aim. It serves as the foundation for organizations and communities to successfully navigate the transition from a focus on reactive treatment to proactive healthcare that seeks to optimize health for individuals and populations.

Converging, too, are the priorities of today's CIOs and clinical IT leaders. Together they rally around shared priorities that support the Triple Aim, such as:

- » Overseeing health system growth, mergers and acquisitions;
- » Consolidating IT systems and vendors;
- » Managing medical images across all 'ologies;
- » Building analytics;
- » Interoperability;
- » Information security; and
- » Enhancing the user experience for physicians and patients.

Let's take a closer look at how CIOs and IT leaders from four leading healthcare organizations, some large and some smaller, are proactively addressing their priorities.

### **Overseeing health system growth, mergers and acquisitions and Consolidation of IT systems and vendors**

Growth through mergers and acquisitions of hospitals, physician practices and physician employment is a major focus of health systems large and small. Health systems are managing growth from several angles: integrating IT systems transparently to end-users, using vendor neutral archives to store clinical images from multiple systems and vendors and consolidating the number of systems and vendors they use to reduce cost, staffing and complexity of managing them. All offer a way to simplify and cut cost.

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With Sanford Health tripling in size over the last four years, they are well-schooled in managing and integrating IT systems as they bring new facilities and physicians into the mix. This also has sparked a strategy to reduce the total number of their IT systems and vendors. Further, the health system is moving to one vendor neutral archive (VNA) that stores multi-'ology images across multiple vendor systems. "The fewer [IT] systems and the fewer vendors we work with, the better off we are," Broekhuis says. Sanford is working to bring consistency to applications such as radiology PACS. They run three PACS, but seek to standardize on one. "We need consistency. It would be in our best interest to have one PACS, not three. There are many reasons to make this transition including better integration and ease of sharing images across our health system. It is better for our physicians and for our patients. It is better all around. Standardization of applications is definitely our strategy, and we are most of the way there because we have [our EMR] everywhere."

University Hospitals is closely managing growth through acquisitions, with a vendor-neutral archive as part of their strategy. Vendor neutrality offers a way to standardize images from multiple vendor and

department PACS and means greater choice in technologies moving forward. “If you employ a proprietary imaging system with a proprietary viewer, you are limited to that viewer. That limitation complicates the integration process of newly acquired facilities and restricts your technology options in the future. With the advancements in healthcare technology today, no one wants to limit themselves,” Foley says.

Vendor neutrality also helps speed the integration process to improve the physician and patient experience as they transition to UH. “As physicians become UH physicians through acquisitions, it’s their expectation and ours to be able to view our patient data as well as share their data with us. It’s vital to patient care and continuity of care,” he says.

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A shared goal across health systems is the narrowing of choices for both systems and vendors. It is an effective way to reduce integration complexities, staff time and maintenance. “Ideally, every health system would use the same technology and vendors. That would allow us to leverage that experience, support structure and the vendor-neutral archive to reduce integration time and effort,” Foley says.

Memorial Hospital shares the strategy: fewer is better. “We need an easier infrastructure to manage, fewer interfaces, fewer points of failure, fewer upgrades and to cut down the variety of vendors,” Thomas says. “The fewer systems and vendors you have, the fewer you have to manage. The fewer links and interfaces are going to break. It means lower total cost of ownership over time because you are reducing the number of relationships, the number of vendors, the number of staff you add to have to manage multiple systems.

Health systems growing through mergers and acquisitions and even those feeling the squeeze of doing more with fewer resources are reacting by simplifying. IT leaders are seeking to standardize on best practice platforms, allowing them to streamline operations and staffing and, ultimately, save money.

### **Managing medical images across all ‘ologies**

Broad access to images has become a priority in healthcare, and a mandate across progressive health systems. For the patient record to be complete, it needs to include full access to clinical images and reports. What is needed is tight integration with a universal viewer that can show multimedia content available outside the EMR, for example PACS or VNA repositories. A link in the EMR that immediately opens the viewer on the correct context is good. Embedding the viewer in the EMR is even better. More health systems, such as University Hospitals, are applying a consolidated image management strategy and building an architecture that scales both from an archiving as well as a diagnostic applications perspective. This also reduces system-to-system integrations.

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An image-enabled EMR helps to improve the quality of patient care by making more information available for physicians to make swifter diagnostic and treatment decisions. Physicians can access a more complete picture of each patient record, simplifying workflow with data, images and reports available at the point of care. This includes current and prior exams, offering greater depth of understanding and trending over time. One patient, one view, wherever and whenever the physician needs them. More access leads to improvements in quality of care and patient safety. It also means better relationships among physicians in sharing information and insight and even an increase in referrals. Physician-patient relationships are strengthened, too. Providing a patient with a better understanding of his or her condition can be empowering to improve compliance with treatment recommendations.

Patients at Memorial Hospital can see a difference, thanks to images available via an imbedded link in the EMR, according to Thomas. “Physicians say images are one of the most interesting things the patients like to look at because they give a picture,” he says. “It’s hard for them to look at clinical documentation such as a physician’s note and understand what they’re doing or saying or what their condition is. As soon as you walk them through an image, it’s a lot easier for them to understand what’s taking place.”

“The impact for physicians has been huge,” Thomas adds. “They can be in the EMR, talking to the patient or doing their own review or doing their own charting and click and see the images and the reports. They tell me the access is intuitive. That is an advantage. I will go as far to say that if facilities don’t have image access in their EMR in 2015, they are hampering their providers’ ability to be timely and effective in their care.”

But we need to remember that EMRs are not image capable. It is the universal viewer that enables a consolidated view of the patient's complete multimedia record. Physicians see a multimedia report with text and imbedded images, adding value to the diagnostic process.

Physicians need a multimedia report, confirms University Hospitals' Foley. That information must be structured and searchable. They also benefit from seeing data over a period of time. "That helps track patient progress and assists physicians with care decisions," he says. "We have images that are easily accessed from the EMR via a direct link to our PACS. One click opens them immediately in a viewer. Physicians also may view the high-resolution image by following a link to the radiology system."

At Sanford Health, hyperlinks to images are imbedded within the EMR, launching directly into a PACS viewer. "As an integrated health system, one of our goals is always to find best practice and to use that across our entire health system. This is an advantage for physicians because they easily have the access they need" Broekhuis says.

To expedite patient care at John Muir, physicians access clinical images via a hyperlink in the EMR. Quick access allows them also to achieve national patient safety goals, such as communicating critical results as well as medication reconciliation and patient identifiers.

Image-enabling the EMR is most effective when the connected viewer is truly enterprise capable, with the ability to visualize a harmonized view of multi-'ology images and other multimedia. The fewer the connections you have, the better they will be—also the least amount of money will be spent.

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## **Building analytics and Interoperability**

Data acquisition is no longer enough. Step 2 needs to be acquiring and building the analytics to change data into insight to help transform care and the business of healthcare. "Data in one place allow physicians to make the best possible decision or complete the most comprehensive research. Interoperability of that data becomes a large part of the analytics platform," University Hospitals' Foley explains.

Analytics help the team at UH examine and decode the clinical information to enhance patient care. "This analysis allows physicians to learn from other patients with similar conditions. They can use this information at the point of care to determine the best course of treatment," he says. UH has patient analytics in their sights as well. Patients have become engaged healthcare consumers and want simple analytics to track their progress. Business stakeholders also need tools that are easy to use and compatible across multiple platforms. As UH acquires new hospitals or practices, for example, multiple financial systems need to be simplified. "Financial systems need to be able to talk to each other to share data, reduce duplicities and streamline processes. They also must be easy to use, accurate, reliable, and consistent."

At Memorial, the analytics strategy is multifaceted: enterprise analytics, clinical, clinical decision support, financial, revenue cycle and supply chain management, Thomas says. They have seen payoffs in the emergency department in improvements in clinical care and financial savings. They are putting the magnifying glass on their 70,000 plus ED visits a year seeking out repeat users. "There are proven models that indicate, if we can engage them, get them in a primary care plan and make sure they're compliant with their medication and lifestyle, we [the tax payers] can avoid a high-cost encounter," he notes. "We want to intelligently identify those patients we can engage with to actually make a difference in their care, and costs, too."

While interoperability of data is a big part of analytics at University Hospitals and Memorial Health, improving interoperability of IT systems is part of a vendor neutral archive project that Womack is working on at John Muir Health. Once established, it will increase interoperability between hospitals and give patients more choices in their care. "The Kaiser here in Walnut Creek, for example, doesn't do hearts. They contract with us [for cardiac care], so you need to have that interoperability to communicate with their system, both from an EMR standpoint, but really from an imaging standpoint because of utilization," she says.

Interoperability of systems is important to multidisciplinary healthcare teams as well. Radiologists and cardiologists, for example, share images in team meetings. With interoperable systems, they can pull up images up easily from one system rather than having to access many systems. With the images, the care team can develop deeper understanding, thus leading to more effective and efficient patient care decision-making.

Improving interoperability and analytics widens access to information and widens the eyes of caregivers as they seek to gain insight from the deluge of available patient data. Opening up systems improves access as well as overall care efficiency.

## **Information security**

Across healthcare, the adoption of EMRs, increased regulation, consolidation among providers, and the increasing need for information sharing among patients, providers, and payers, all point towards the need for better information security. Unlike other businesses, healthcare must manage personal and financial and payment data and even intellectual property. Security is embodied in standards and technology that enable confidentiality of healthcare information and health data integrity policies to be carried out. To stay ahead of information security, health systems need to continually review their plans as well as acquiring technical expertise and business knowledge. Mandates to safeguard data are coming from governments, regulators and patients alike.

Within healthcare, some 46 percent of all breaches occurred from theft or loss, while 15 percent were attributed to insider abuse, according to a 2014 healthcare data breach report from Verizon. Point-of-sale intrusion generated 9 percent of events.

With data breaches on the rise, health systems are on high alert. CIOs and IT leaders are focused on security internal and external to the organization. Sanford Health, for example, is ever-alert and focused when it comes to data security. "It is an overarching goal that touches everything we do" Broekhuis says. "We have a security plan that we are updating on a regular basis. It is front and center, all the way up to our CEO having that as a top priority."

Sharing more data means securing it first. Health systems need to continually review their security plans, monitoring the foibles of others and safeguarding patient data at all cost.

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## **Enhancing the user experience for physicians and patients**

To connect vital stakeholders, the IT team at University Hospitals is enhancing the user experience so it is convenient and intuitive for physicians, employees, business stakeholders and patients. "Patients need and want all of their data in one place," says Foley. "They want ease of use and a trusted partner. We engage them with online personal health records and patient portals. These portals allow patients to view lab results, send secure messages to their physician, request medication refills, pay their healthcare bills, and complete home monitoring through medical devices that report data directly to their physician. Patients have access to all of this and more online, 24 hours a day, at their convenience. This is fulfilling patient needs and demands and is enhancing patient experience."

It all falls under the topic of digital health. Digital health is next generation healthcare. "We all need to make sure we're always looking down the road," Foley says. "We need to make sure our IT systems will be compatible and interoperable with all the systems in our legacy healthcare environment."

At Sanford Health, optimizing data for caregivers and patients is a core priority, too. The health IT team is optimizing the EMR for physicians, nursing and revenue cycle.

They also are enhancing the patient experience via a patient portal. They are leading the edge with mobile video visits from the portal. "We need to push our applications and offer what patients need and want," Broekhuis says.

Building a solid and full-functioning PHR (personal health record) was a key piece of the strategy to engage patients in their own care at Memorial Hospital. "Patients need easy access to their information; not the same way doctor's do, it is very different," says Thomas.

John Muir Health is a small, independent health system in northern California known for very high quality healthcare in a state dominated by mega systems. So to them, being front and center to caregivers and patients was a must, says Womack. The health system set out to offer a single patient record across all caregivers, while a patient portal links patients to caregivers, thus streamlining registration and scheduling and offering easy to use online access to clinical information. "Patients are getting smarter about healthcare," she says. "They're looking at the quality ratings before they make decisions on where to have surgery. We [as health systems] need to listen more to the patient. We need to offer that transparency and interoperability. That needs to be a goal."

Building a better user experience for physicians and patients comes down to interoperable IT systems that offer quick access and good usability.



A simplified and shared IT vision may be the answer to conquer infrastructure and keep up with health system growth, be it organic or generated by mergers and acquisitions. Our CIO and IT experts tell us fewer, more interoperable and integrated IT systems may be better in the long run and physicians, caregiver teams and patients need access to complete patient records. But how do we continue to enhance data access and availability and make the patient journey better—and how are CIOs perfecting and propelling the process? In a series of in-depth four case studies, our CIOs and IT leaders show us how they have put strategies into action. Read on to learn from their goals, game plans, solutions and successes.

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## Case Studies

### BUILDING THE DATA BRIDGE TO PATIENT CARE

#### Cleveland UNIVERSITY HOSPITALS: SETTING STRATEGIES AND PRIORITIES

University Hospitals (UH) in Cleveland has made it a priority to unite caregivers and information. This \$3.5 billion health system is focused on providing comprehensive community-based care and growing the system via acquisitions and physician employment. IT is at the center of the strategy.

“We’re focused on a growth mandate,” says Foley, who took the CIO helm two years ago. “Specifically, we are expanding and leveraging our operating platform especially in the face of reimbursement reductions. We are looking to leverage size and scale. We need to find effective ways to share clinical data, enabling a community view of care, medical records and clinical information across a broader platform. Whether it’s UH employed, affiliated or independent physicians, connecting the community is a major part of our agenda. We also need to give patients full access to data to try to improve their care and the well-being of the community. Those connections need to be made easily.”

The UH community is a large one. The system’s 1032-bed, tertiary medical center, University Hospitals, is an affiliate of Case Western Reserve University. U.S. News & World Report has ranked University Hospitals Case Medical Center among America’s 50 best hospitals in all 12 methodology-ranked specialties. UH also includes University Hospitals Rainbow Babies & Children’s Hospital, University Hospitals Seidman Cancer Center, part of National Cancer Institute-designated Case Comprehensive Cancer Center at Case Western Reserve University and University Hospitals MacDonalD Women’s Hospital. More than 25,000 physicians and employees constitute University Hospitals and its partnership hospitals. Annually, UH performs more than 4.5 million outpatient procedures and nearly 63,000 inpatient discharges.

Along with growth, UH has a whole new strategy in IT. Instead of using systems that push information from one hospital and physician to the other, UH is employing personal health records and patient portal technology that encourage patient engagement. These portals allow for two-way communication between patients and their physicians. Physicians can send lab and x-ray results to the patient portal and patients can use the portal to view results, request medication refills and appointments, and send secure messages to their physician. UH currently engages more than 56,000 of its patients through the UH Personal Health Record. For the physician, the EMR interface needs to be seamless, transparent and easy to navigate. “If the system is not easy to use, we won’t capture the patient data we want. Our physicians are realizing that more digital information, including images, means a more complete picture of the patient’s care,” Foley says. Direct links to Sectra PACS from within the EMR allow physicians to immediately view an image. Physicians also may view the high-resolution image by following a link to the radiology system.

Foley points out that the Sectra company name stands for SECure TRANsmission. “They understand how to move data quickly and securely. The systems we have for radiology are very good, easily accessible, high speed, and one of the most stable and reliable systems that we have.”

To further enhance PACS connectivity, UH also is building a vendor-neutral archive that allows them to store all medical images, including radiology, cardiology, gastroenterology, dermatology, ophthalmology and orthopedics, in one place for easy access. UH saves DICOM images in the VNA, and incorporates a DICOM wrapper around non-DICOM images to save them in the archive as well.

“Being vendor neutral is key to image management,” Foley says. “Our large image database now stores multiple types of images without relying on a proprietary image viewer.” It also offers a business advantage: part speed, part throughput and part physician satisfaction.

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The VNA also is essential to UH's growth initiative through acquisitions. Clinical data sharing is essential when it comes to bringing hospitals and practices into the UH system. "While financial systems integration is important, clinical data integration occurs first. When physicians come on board as part of an acquisition, they expect to be able to share their patient data and likewise view our patient data," Foley says. "Every patient has that same expectation—seamless integration of their data."

Simplification and consolidation of technology also is an important part of the IT strategy. It is a growing trend across healthcare, and a priority at UH. The strategy is a move to put users across the system on the same IT platform, sharing and leveraging capability. "When you acquire other facilities, you inherit their current systems. This can make integration a challenge. The ultimate goal is to have every facility in our system using the same technology. We could then leverage that support structure to further innovate our systems." Simplification and more effective communication between systems also frees up staffing and reduces maintenance.

It's a challenge to make the complex simple. But UH is answering the call. The overall goal is patient-centered care. "We need a complete picture of patient health," Foley says, "from one access point for the physician and another for the patient. It has to be done, and done well."

## **Northern and Midwest, U.S.**

### **SANFORD HEALTH:OPTIMIZATION ACROSS A LARGE RURAL ENTERPRISE**

Offering comprehensive patient-centered care, optimizing its EMR for physicians and clinicians, information security, standardizing IT platforms, data warehousing and expanding the patient portal are the top 2015 priorities for Broekhuis, CIO of Sanford Health, a health system that has tripled in size over the last four years.

"We are focused on [EMR] optimization for physicians, nursing and revenue cycle," Broekhuis says. "We are taking the electronic health record we have been implementing for more than 10 years and making it hum. Making it more efficient for clinicians and making it better for patients. Making it work better for the organization, too."

"We always have to stay focused on security, too," Broekhuis adds. "It is an overarching goal that touches everything we do. We have a security plan that we update on a regular basis. It is front and center, all the way up to our CEO, having that as a top priority."

Sanford Health is an integrated health system headquartered in the Dakotas and is now the largest rural, not-for-profit health care system in the nation with locations in more than 300 communities in nine states. In addition, Sanford Health has developed international clinics in Ghana and Mexico. Sanford Health includes 43 hospitals, 243 clinics and more than 1,400 physicians in more than 80 specialty areas of medicine. With more than 26,000 employees, Sanford Health is the largest employer in North and South Dakota. The health plan manages 100,000 covered lives. Total operating revenue for the organization was \$3.4 billion last year.

An Epic EMR has been central to growth. Sanford Health began deploying the system a decade ago. Today the depth of the deployment is significant: 1,400 physicians are using the system across 37 hospitals.

Across the enterprise, the Sanford team is seeking to more tightly integrate the variety of IT systems they have. Simplifying and standardizing IT systems is the goal. "The fewer [IT] systems and the fewer vendors we work with the better off we are," Broekhuis says. They are working to bring consistency to applications such as radiology PACS. They run three PACS, but seek to standardize on one.

"We need consistency. It would be in our best interest to have one PACS, not three. There are many reasons to make this transition including better integration and ease of sharing images across our health system. It is better for our physicians and for our patients. It is better all around. Standardization of applications is definitely our strategy, and we are most of the way there because we have [our EMR] everywhere."

Image-enabling their EMR and tighter integration is a driver in providing clinical images to physicians across the health system. Via their three PACS, links to images are imbedded within the Epic EMR, launching directly into a PACS-based viewer. "As an integrated health system, one of our goals is always to find best practice and to use that across our entire health system. Standardizing and being more cost effective allows us to establish better practice. This is an advantage for our physicians,

having the access they need. Having images available to all clinicians is vitally important in the PACS world," he says.

The health system also seeks to fortify and standardize on one vendor neutral archive that stores multi-vendor images across multiple vendor systems. "If that is where you are storing all your images enterprise-wide, you can get really good at what you do," Broekhuis offers. "You can get really good at being reliable and making it fast. That all pays off in the end."

Data warehousing is another item on their 2015 priorities list. Being fairly new to data warehousing, the health system is getting the base platform established and getting consistent data into it. "We just know it is a must for where healthcare is going to be able to do reporting across our entire health system," he says. "Our industry on a scale of 1 to 10 is at a 2 at the highest. We all need to get better at using the data generated from our EMRs. I think we are headed in a good direction."

The last initiative comes full circle and back to the patient. Optimizing and maximizing their patient portal is another key project at Sanford. "We see this as a very important initiative to engage the patient and to remain patient-centric," Broekhuis says. "We are now live with mobile video visits from our patient portal. We are one of the earlier systems to do that with the EMR. We need to push our applications and offer what patients need and want."

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## **Gulfport, Miss**

### **MEMORIAL HOSPITAL:HARMONIZING IMAGES AND THE EMR**

Memorial Hospital in Gulfport, Miss., has long been a progressive investor in medical imaging, EMRs and advanced surgical techniques. Their strategic decisions are based on six core strategies: customer satisfaction, growth, work environment, finance, quality/patient safety/IT and strong hospital-physician relationship. Another factor weighing heavily on decision-making is their location on the Gulf Coast of Mississippi less than a mile from the water. "That's why we went remote to host our data," says Thomas who took the CIO helm about 3 ½ years ago.

Memorial Hospital is a not-for-profit, multi-specialty medical complex in Gulfport, Miss., jointly owned by the City of Gulfport and Harrison County since 1946. It is one of the most comprehensive health care systems in Mississippi, licensed for 445-beds, including an inpatient rehabilitation unit, a behavioral health facility, satellite outpatient diagnostic and rehabilitation centers and more than 80 Memorial Physician Clinics. They are the largest provider of care on the coast between New Orleans and Mobile, Ala.

Memorial offers several of the region's most comprehensive clinical programs, such as Mississippi's first nationally certified stroke center, the only neonatal NICU and behavioral health facility on the coast as well as emergency medicine, women and children services, orthopedics, medical rehabilitation, cardiovascular services, neurosciences and oncology. There are 450 providers on the medical staff, with a little more than half employed by the hospital, and 3,100 employees. Each year, they do about 400,000 ambulatory visits, 180,000 outpatient service procedures and 70,000 ED visits and 17,000 inpatient discharges.

Patient-centric care is a priority at Memorial. The center of the enterprise is the Cerner EMR that went live in June 2014, standardizing the health system on one EMR vs. the three they had previously. The EMR unites caregivers and administrators and allows data access for patients to play a larger role in their own care. "We focus on the patient and his or her care," Thomas says. "The data are pretty clear that you get benefit in terms of being more efficient and improving care. Focusing on quality gives you benefits of healthier patients, better patients, lower cost and more throughput. Through the EMR, all information is gathered and available for caregivers. And that means patients, too, who are so much more engaged in their own care today."

It also means building a solid and full-functioning PHR (personal health record). "Patients need easy access to their information; not the same way doctor's do, it is very different," says Thomas.

Stabilizing and optimizing the EMR, all the systems feeding information to it including PACS, are top of mind for Thomas as is running on maximum efficiency. The health system continues to push their teams and IT systems to provide better outcomes, to reduce length of stay and become more financially efficient. Secure text messaging for nurses and providers offers instant communication, real time, provider to provider, clinician to clinician. "It can be a group text, such as when you're getting ready to discharge a patient. The floor or ED nurse can contact the doctor easily without an intrusive phone call. The answer is typically immediate. When we discharge a patient, we want to



make sure he or she has the right discharge instructions and the right education about what to do. It's reduced the number of times a patient says to the surgeon—who we know is a busy person on a schedule with workflow—'I've got some questions.' And again, it helps outcomes."

Memorial has been a long-time Sectra PACS user, as well utilizing Sectra enterprise storage for radiology and cardiology. PACS images were a key piece integrated with the new EMR. "We are very integrated with Sectra, we took as many applications as we could," he says, noting PACS images and enterprise storage are remotely hosted.

Physicians access PACS images via an imbedded link in the EMR. Radiology images are available across the modalities. "Images are patient-context driven, so when the physician clicks on it, it launches Sectra [PACS]. The physicians see the appropriate images. This replaces access via a physician portal [that we used] before integrating PACS with the EMR." Cardiology images are in Thomas' sights in the future.

"The impact for physicians has been huge," he says. "They can be in the EMR, talking to the patient or doing their own review or doing their own charting and click and see the images and the reports. They tell me the access is intuitive. That is an advantage. I will go as far to say that if facilities don't have image access in their EMR in 2015 anybody, they are hampering their providers' ability to be timely and effective in their care."

Patients have seen a difference, too. "Images are one of the most interesting things the patients like to look at because they give a picture. It's hard for them to look at clinical documentation such as a physician's note and understand what they're doing or saying or what their condition is. As soon as you walk them through an image, it's a lot easier for them to understand what's taking place."

The health system also accesses images via the Mississippi Health Information Network (MISHIN), founded shortly after Hurricane Katrina devastated the Gulf Coast in 2005.

Thomas also is focused on building the right foundation for analytics. "My priority is enterprise analytics, clinical, clinical decision support, financial, revenue cycle and supply chain management."

The ED is one area Thomas sees analytics paying off, in terms of improvements in clinical care and financial savings. "We have 70,000 ED visits a year. We're not unlike other community hospitals that many of those visits are not appropriate for the ED. Bumps and bruises, but more importantly the unmanaged manageable condition. With analytics, we want to use the data to look at what resources, human and financial, we are expending. What do we see among the thousands of patients we see come into the ED repetitively. We know that if we can engage them, get them primary care and make sure they're compliant with their medication and lifestyle, we can avoid a high-cost encounter. We want to intelligently identify those patients we can engage with to actually make a difference in their care, and costs, too."

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Reducing cost of ownership is another initiative Thomas is focused on. Specifically, trying to reduce the number of systems and integrations across the Memorial enterprise. That would mean simplifying data across the clinical and financial spectrums. "The reasons are clearly financial. We need an easier infrastructure to manage, fewer interfaces, fewer points of failure, fewer upgrades and to cut down the variety of vendors.

Vendors don't coordinate their upgrades [among one another]. Links break. We have to be the coordinator. It gets complex with making sure things still work well. It is true: the fewer systems and vendors you have, the fewer you have to manage. The fewer links and interfaces are going to break. It means lower total cost of ownership over time because you are reducing the number of relationships, the number of vendors, the number of staff you have to have to manage multiple systems. The potential down side is putting more eggs in fewer baskets which is why picking the right partners is really important. Are your vendors substantial? Will they be around? Do they have the support infrastructure and corporate capabilities for the long term?"

Thomas has his own checklist of vendor-relationship musts.

- » Functionality: Are you going to meet the needs of the clinicians? Enabling more informed decisions, make data more actionable, offer more insight?
- » Technology: Can I support the function ality?
- » Total cost of ownership (TCO)

» Vision: Does the vendor have the vision, stability and offer the partnership we seek?

“This is all pretty complex,” Thomas sums. “Making things simpler always is. For our health system, we want what clinicians want: the right information accurately at the point of care, with robust clinical decision support to aid in decision making, diagnosis making and care giving. I want mobility so caregivers can connect seamlessly no matter where they are. I also want to provide them with a more effective way to get through each encounter so that they can spend more time in front of the patient. I don’t want to bombard them with technology.”

What’s more, he wants technology that is transparent but part of their workflow. And technology to give them data to make smarter decisions. For example, “if you use this medication as opposed to that medication, it could cost the patient less, the tax payer less and the efficacy is same or near the same. That’s the analytics side. We need to have it all.”

## **Northern California, U.S.**

### **JOHN MUIR: SMALL, MIGHTY AND CONNECTED**

Transformation is never a word to be underestimated in healthcare today. A few years ago, John Muir Health set out on an initiative to use technology to transform, system-wide, the way they work. Patient-centered care was central to change, with the system and its C-level and IT leadership dedicated to investing in technology, people and processes to make it easier for patients to navigate the system. They brought in an EMR and sought to make care more robust, operationally efficient and affordable, says Womack RT(R), the executive director of imaging services and a long-time clinical systems leader.

The health system also set out to offer a single patient record across all caregivers within the network. A patient portal links patients to caregivers, streamlining registration and scheduling and offering easy to use online access to clinical information. With a single revenue cycle system, John Muir enabled risk-sharing revenue models like the accountable care organization (ACO) now in the works with the University of California San Francisco. They established IT infrastructure to allow information sharing with outside healthcare organizations via health information exchange. And a single patient identifier allows for better coordinated care by removing confusion in patient identification.

John Muir Health is a small, independent health system in northern California known for very high quality healthcare in a state dominated by mega systems. The three hospital community system, formed in 1997, includes a behavioral health hospital, a level two trauma center, and an acute care hospital. They excel in cardiovascular care. John Muir Medical Center, Walnut Creek has been ranked one of the nation’s top hospitals by U.S. News & World Report in its annual list of America’s Best Hospitals. The only non-academic medical center in northern California to appear in the Top 50, John Muir Medical Center, Walnut Creek is named #50 in gastroenterology and #40 in orthopedics, making the hospital one of the top-ranked facilities in California in these specialties. Through a new partnership with Stanford Children’s Hospital, they recently opened the first pediatric ICU in the East Bay.

“John Muir’s philosophy is offering the ultimate patient experience,” Womack says. “Along with safety, patient experience and affordability and the high quality we’ve always had. The triple aim: that is our priority.”

To the radiology department, it means “being able, in this era of high-deductible plans and patients very sensitive to price, to offer high quality imaging exams at a price patients can pay. They are [moving toward making decisions based on] price. If not today, soon.”

It is clear that health systems are competing on price, but it comes down to good care to keep patients coming back. Expedited service, especially in radiology services, always helps. “Patients want to know results quickly,” she says. “We work hard to see that our turnaround times are fast and the patient gets a link to their email and get to read the report. Then they can coordinate better with their physicians on the next step. I know that if I can get a patient to come to John Muir who has the complete patient experience, that total continuum of care and quality, they will come back. But the cost must be reasonable.”

Access to and engagement by the medical staff stands out for patients, too. As does integrated patient care like we see with physicians teaming to offer advice via tumor boards. The integration of physicians in daily patient care makes the difference in good and great care—and keeping patients coming back.

Patients also are more engaged with their care experience. “We need to give them the tools they need, whether it be utilizing our EHR to make appointments or utilizing technology to do call reminders,” Womack notes. “We used to struggle, we just didn’t have the technology in place.”

To expedite patient care, physicians across the John Muir system can access clinical images and reports via the EMR. Images are integrated into the EMR via a hyperlink. Quick access allows them also to achieve national patient safety goals, such as communicating critical results as well as medication reconciliation and patient identifiers.

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The physician clicks on a hyperlink inside the EMR to launch the Sectra PACS viewer. Physicians have full access to EMR data as well as images, prior studies and reports. Womack is working on the next step: access to images outside of radiology. “You’ve got all the other ‘ologies that want to store their images, but the problem is many of them haven’t been as stringent as radiology in having a unique identifier, or an accession number that has not only the accession number, but the patient name and demographic. Basically, they lack demographic or HL7 data attached to the images. They want to put it in the EMR, but to do that, they have to set parameters.”

Once the parameters are established, choosing the right viewer is next on the list. That will be part of a vendor neutral archive project Womack is working on. Having a VNA allows interoperability between hospitals and gives patients more choices in their care. Today, patients often jump between nearby health systems seeking opinions and advice. “For example, you can be a Kaiser patient, but then you have a heart attack,” Womack explains. “The Kaiser here in Walnut Creek, for example, doesn’t do hearts. They contract with us [for cardiac care], so you need to have that interoperability to communicate with their system, both from an EMR standpoint, but really from an imaging standpoint because of utilization.”

No doubt there is inefficiency when multiple providers cannot share patient information. Womack sees a lot of unnecessary tests now due to patients transferred into John Muir because they are unable to get prior studies. “That contributes to the rise in healthcare because now you’re doing unnecessary studies,” she says. “That’s where VNAs help since they have that backbone that you can have that interoperability with with other organizations.”

Health systems like John Muir also are looking to simplify by reducing the number of IT systems they use and, thus, the integrations they need to manage. “It’s the cost of maintaining those interfaces not only from a support and staffing perspective. You’ve got your staff watching the interfaces to see if they go down. It’s also coordinating upgrades for all the systems that interface. It is very, very costly. If you can limit the number of interfaces, the data will be richer and you can limit the people it takes to manage the data.”

But it all comes back to patients, Womack says. “Patients are getting smarter about health care. They’re looking at the quality ratings before they make decisions on where to have surgery. We [as health systems] need to listen more to the patient. Let’s we equate it to banking. I live in California and I bank at Bank of America. I can go to Colorado and go to a Bank of America ATM machine and get money out. Why doesn’t healthcare have the same thing? If I am the patient and I have tests done at one facility and want them accessible to another, why cannot I arrange that? There’s no way for that hospital to be able to look at my record. Patients are getting fed up with the excuses and fed up with why we can’t do it. We need to offer that transparency and interoperability. That needs to be a goal.”

## CONCLUSION

Goals are being achieved and exceeded for sure. Patient-centered medicine is thriving in these innovative health systems and hospitals. But the job is far from done, the experts agree. CIOs, clinical leaders and their teams continue to push the limits of the integrated, interoperable and secure IT-powered healthcare enterprise. They are making electronic medical records more accessible, user-friendly and asset-rich—and data tied to systems, not vendors. They are unlocking data silos so caregivers can immediately grab resources they need such as images from radiology, cardiology, pathology, orthopedics and many more. Department insight and knowledge are now enterprise tools. Analytics elevates healthcare data into intelligence for patients, populations and healthcare administrators. Health IT leaders also are consolidating data, healthcare providers and amassing intelligence. Collectively, these leading health systems are achieving the Triple Aim: improving the quality of healthcare, enhancing the patient experience and managing and reducing costs of care. As innovators, their quest for truly connected healthcare continues. It is through experience that we gain insight, and through communication that healthcare will continue to improve. One patient at a time.

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Published on : Wed, 6 Apr 2016