The New Healthcare Enterprise

Leveraging Healthcare IT to Achieve Connected Care, Healthcare Reform

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The goal of healthcare reform legislation – from the HITECH Act of 2009 to the Patient Protection and Affordable Care Act of 2010 (ACA) – is to improve the quality of care and clinical outcomes in a cost-effective manner. Federal mandates are spurring the deployment of healthcare information technology (IT) to help enable a new healthcare enterprise, one that emphasizes collaborative care across the continuum, essentially tearing down the walls separating inpatient and outpatient facilities and even patient homes to achieve this transformative concept of connected care.

Electronic health record (EHR) and electronic medical record (EMR) systems[1] are the most widely adopted healthcare IT, driven by financial incentives from the Medicare and Medicaid EHR Incentive Programs. Indeed, the Centers for Medicare and Medicaid Services (CMS) reported that by the end of June 2013, EHR reimbursements totaled more than $15.1 billion. The new healthcare enterprise, however, requires adoption of other platforms, applications and devices to maximize their investments in EHRs and EMRs and ensure coordination of care in order to meet all healthcare reform initiatives. Just as important, these healthcare IT solutions need to be interoperable with and seamlessly connected to the EHR or EMR so clinicians and other staff across the healthcare enterprise can securely yet easily access and share real-time patient information to design, deliver and measure high-quality care.

HIMSS Media conducted a survey earlier this year, on behalf of Philips Healthcare, a leading provider of healthcare enterprise software solutions and medical devices, to determine how hospitals and health systems are prioritizing technology investment and adoption to address healthcare reform initiatives, as well as preparing to meet meaningful use Stage 2 criteria, which begins in 2014. Of the 142 respondents, 85 percent represent either standalone hospitals or integrated delivery networks (IDNs). With nearly 40 percent of respondents in C-level positions, with the predominant position being CIO, and another 30 percent comprising IT directors and managers, the survey provides a solid snapshot of the current state of healthcare IT in the acute-care setting.

Key to Stage 2 meaningful use: connectivity and interoperability

Not surprisingly, when asked to rank the five most important considerations for clinical technology purchase decisions, 43 percent of survey respondents ranked technology that is linked to EMR adoption as the top consideration, followed by technology that drives measurable clinical improvements (32 percent) (Table 1). With eligible hospitals and health systems having already achieved or in the process of achieving Stage 1, many are now preparing for the next, more demanding set of criteria – with interoperability a key focus, and going beyond aggregating and digitizing data to driving real-time actionable information at the point of care, measuring clinical outcomes and sharing patient information to improve the quality of care. According to Sara Coulter, Director of Government & Industry Relations for Philips, healthcare organizations are looking for ways to bridge the gap between their EMRs and other technology used to manage patient data in their healthcare enterprise.

"Clinical device and systems integration is a very important component of a hospital's meaningful use strategy," said Coulter, who is on the College of Healthcare Information Management Executives (CHIME) board of trustees. In her discussions with CIOs and IT managers, she found that hospitals and health systems are looking at integration of

Table 1:
Please rank, in order, the five most important considerations for clinical technology purchase decisions, with "1" being the most important and "5" being the least important. Leave all others blank.

The technology:	1	2	3	4	5
Is linked to EMR adoption	43%	16%	10%	12%	18%
Expands or enhances EMR functionality	23%	26%	14%	16%	20%
Is interoperable with EMR	24%	31%	21%	17%	7%
Is interoperable with existing clinical information systems	21%	22%	25%	19%	14%
Can be leveraged for multiple projects	8%	8%	26%	28%	31%
Can be implemented in phases/modules – by department and/or facility	6%	10%	23%	26%	36%
Supports standardization across the enterprise	10%	10%	36%	28%	16%
Drives measurable clinical improvements (e.g., reduced mortality)	32%	18%	11%	23%	16%
Drives measurable operational improvements (e.g., reduced LOS, reduced cost of losses via asset tracking)	11%	40%	16%	13%	19%
Supports physician recruitment efforts	23%	15%	15%	39%	8%
Supports new program development	22%	0	28%	17%	33%
Connects inpatient, outpatient and other organizational entities (e.g., physician offices, homes, clinics)	27%	10%	12%	16%	34%

[1] EMRs replicate all aspects of a healthcare provider's paper charting. EHRs are essentially EMRs with the capability of following the patient from healthcare provider to healthcare provider, thereby enabling electronic exchange of information and messaging. For the purposes of this white paper, however, the two terms are interchangeable.

" Our proximity to the patient provides us with deep clinical knowledge because we are the providers, the analyzers and the interpreters of near patient high-resolution data and we support interoperability with information that is further away from the patient's immediate setting such as demographics and diagnosis and other data in an EHR and other clinical systems. "

– Joe Frassica, Vice President, CMIO and CIO for Philips

devices and specialty systems, such as labor and delivery or cardiology systems, with EMRs as they approach Stage 2 meaningful use criteria. "The bar has been raised for Stage 2, and providers are going to need to collect more clinical data, meet more quality metrics reporting requirements, add clinical images to EHRs and focus on EHR interoperability," she said. "Specialty systems will help providers meet meaningful use requirements, and also improve the quality and amount of patient data reporting by leveraging information from many sources."

Over the course of several years, Philips has developed its solutions and services to meet the demands of the new healthcare enterprise and the concept of connected care. Philips' IntelliBridge Enterprise, an interfacing solution, for example, enables a hospital or health system's EMR to be connected to and interoperable with many of Philips healthcare solutions. It goes beyond purely interoperability between the hospital's EMR and its other information systems, whether clinical systems such as radiology information systems or patient registration systems, such as admit, discharge, transfer (ADT) systems, using HL7 data exchange standards to facilitate bi-directional data exchange. Philips IntelliBridge Enterprise also provides added benefits for clinical workflow such as simplifying electronic waveform export for nursing. On the clinical side, EMR adoption rises when patient information can be quickly and easily retrieved, and clinicians can better manage their patients' care when they have a comprehensive view of their patients. On the IT side, by reducing the number of points of interfacing to one standards-based connection, hospitals and health systems can streamline information systems interfacing and IT management as well as reduce costs.

Another example of connecting care and EMR interoperability is via Philips IntelliSpace PACS. The interoperability with the EMR system and advanced API functionality delivers a solution that can also image-enable an organization's EMR. This can allow clinicians to access images through their hospital or health system's EMR. The IntelliSpace PACS architecture was designed to improve workflow and efficiency across the entire enterprise for clinicians, technologists, the IT department and administrators. Many hospitals have successfully integrated IntelliSpace PACS into their enterprise-wide EMRs. IntelliSpace PACS' vendor-neutral platform allows it to archive medical images from virtually any PACS, which reduces IT footprint and cost. Mobile clinicians can tap IntelliSpace PACS Anywhere to access images outside the walls of the traditional healthcare setting, furthering the concept of connected care.

The HIMSS Media survey results show that hospitals and health systems are seeking and deploying solutions such as IntelliBridge Enterprise for their interoperability and clinical information sharing capabilities and the benefits they deliver when interfaced with EMRs (Table 1). Clinical information systems that are EMR ready, such as IntelliSpace PACS, are also desirable for their ability to directly "talk" with other clinical information systems to easily provide image access. A look at the combined top two rankings for technology capabilities that are important considerations for clinical technology purchase decisions – technologies that are interoperable with EMR (24 percent and 31 percent), expands or enhances EMR functionality (23 percent and 26 percent), is interoperable with existing clinical information systems (21 percent and 22 percent) and drives measurable operational improvements (11 percent and 40 percent) – reveal a demand for interoperable solutions and EMR augmentation.

When asked to identify the relative importance in choosing clinical technologies, EMR interoperability, at 44 percent, was by far the most important consideration for survey respondents (Table 2). With Stage 2 meaningful use criteria requiring more complex health information exchange among healthcare providers, interoperability of clinical IT systems is critical. The ability to share patient information is also necessary for Medicare fee-for-service program providers to meet CMS's Medicare Shared Savings Program (MSSP) requirements to become an accountable care

Table 2:

In choosing clinical technologies, please identify the relative importance ("1" being most important and "5" being the least important) of the following:

Clinical technologies	1	2	3	4	5
Price	15%	12%	18%	20%	17%
Ease of use	16%	22%	23%	19%	14%
Interoperability with EMR	44%	28%	11%	8%	6%
Evidence-based proof point (e.g., improved clinical outcomes, reduced LOS)	18%	20%	18%	17%	15%
Support services (lifecycle management)	5%	10%	13%	17%	21%
Interoperability with infrastructure	13%	20%	22%	13%	19%

> " EMRs must meaningfully use the information across a hospital's network to improve care and add value for the patient. One of the major complaints of hospital systems about their EMRs is their inability to access the data that's incorporated into the EMR and use it for meaningful patient intervention. While EMRs are collecting and cataloging patient information, they are not always aggregating data in ways that make clinical sense or "liberating" the data for patient care. "
>
> *– Joe Frassica, Vice President, CMIO and CIO for Philips*

organization (ACO). Hospitals and health systems must be able to coordinate care with their ACO partners in order to deliver high-quality care in a cost-efficient manner and share in the savings it achieves for the Medicare program.

Enhancing EMRs for improved quality of care, reporting and measuring

EMR applications, selected by 53 percent of survey respondents, were identified as garnering the lion's share of their healthcare organization's technology purchasing budget, with interfacing and integration applications being selected by 27 percent (Figure 1). Many hospitals and health systems recognize that EMRs alone cannot meet the new requirements or other healthcare reform initiatives. "EMRs must meaningfully use the information across a hospital's network to improve care and add value for the patient," said Joe Frassica, Vice President, CMIO and CIO for Philips. "One of the major complaints of hospital systems about their EMRs is their inability to access the data that's incorporated into the EMR and use it for meaningful patient intervention," he said. While EMRs are collecting and cataloging patient information, they are not always aggregating data in ways that make clinical sense or "liberating" the data for patient care.

As clinical data grows exponentially and is captured and exchanged among EMRs across the healthcare enterprise, CIOs and IT directors will need to better manage the data and make it easily accessible to clinical and business end-users. "Clinicians are confronted with a lot of data from multiple systems, devices and other sources," said Heather Willis, Senior Director of Marketing for Patient Care & Clinical Informatics at Philips.

Deploying clinical decision support tools at the point of care helps synthesize huge amounts of data into more granular and clinically relevant information. "Philips has developed considerable expertise in taking those pieces of information and incorporating them into visual tools that allow clinicians to say 'I need to act on this,'" Willis said. "Coupled with easy-to-interpret trend data, the tools also help clinicians evaluate the effectiveness of interventions."

One such example is the Car Safety Seat Assessment Record (CAR), a Philips-developed application to monitor the pre-term infant in a semi-reclining car safety seat for a selected period of time to help determine discharge readiness. The application captures three important clinical events (bradycardia, apnea and desaturation), displays a real-time histogram of oxygen saturation measurements and generates a detailed report to help clinicians assess discharge readiness as recommended by the American Academy of Pediatrics.[2]

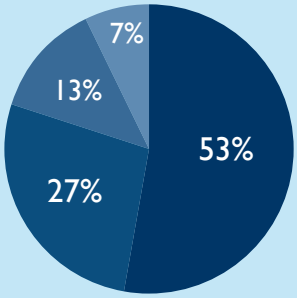
Early warning systems, another type of clinical decision support technology, are being used by 33 percent of survey respondents to meet healthcare reform initiatives (Figure 2). Philips IntelliVue Guardian Solution monitors acute-care patients and detects subtle signs of deterioration using automated early warning scoring to facilitate early intervention and prevention of costly transfers to the intensive care unit. The software, which runs on a healthcare enterprise's existing network, provides clinical insight by looking at vital signs in the context of other clinical findings. For example, a higher than normal heart rate by itself may not warrant clinical attention, but the same heart rate accompanied by fever and rapid respiration will trigger an alert.

Indeed, the software has proven its effectiveness. In a controlled research study published in the *Journal of Critical Care Medicine*, the use of IntelliVue Guardian Solution to identify at-risk patients resulted in a decrease in mortality and Length of Stay (LOS) and reduced time required for measuring vital signs.[3] IntelliVue Guardian Solution exports data to the EMR, allowing all patient information to be generated by the software and therefore centralized and easily accessible.

Mobile connectivity for providers in and outside of traditional care settings

Extending technologies outside hospital walls, into outpatient settings and patient homes, will enable healthcare organizations to coordinate care across all patient touchpoints. By feeding key patient data such as vital signs and medical images from the home and outpatient settings, respectively, into the EMR, a patient's medical record will be up to date, comprehensive

Figure 1:
What is the general breakdown of your budget on technology purchasing?



53%	EMR applications
27%	Interfacing and integration
13%	Network infrastructure
7%	Desktop, server hardware

[2] American Academy of Pediatrics, Committee on Injury and Poison Prevention. (1996) Safe transportation of premature and low birth weight infants. Pediatrics. 97:758-760.
[3] Bellomo, R., Ackerman, M., Bailey, M., Beale, R., Clancy, G., Danesh, V., . . . VITAL Care Study Investigators. (2012) A Controlled trial of electronic automated advisory vital signs monitoring in general hospital wards. *The Journal of Critical Care Medicine*. 40(8): 2349-2361.

and centralized. Authorized clinicians can then easily access this comprehensive data to aid clinical decision support, meeting the twin goals of improved clinical outcomes and cost effectiveness. Survey participants reported deploying their IT systems to the following entities to address healthcare reform requirements: physician offices (78 percent), ambulatory surgery centers (47 percent), diagnostic imaging centers (41 percent), urgent care centers (32 percent) and patient homes (30 percent) (Figure 3).

Using IT systems to coordinate care is key to achieving numerous healthcare reform initiatives. The Hospital Readmissions Reduction Program under ACA requires CMS to reduce payments to hospitals with excess readmission ratios for patients with acute myocardial infarction, heart failure and pneumonia within 30 days of being discharged. The maximum penalty will increase to 2 percent for discharges starting in 2013 and 3 percent in 2014. Coordinating care with primary care, specialists, other caregivers, and patients and their family members can help keep patients from returning to the acute-care setting. Care coordination will also be critical in keeping patients healthy and sharing in financial savings for ACOs participating in CMS's MSSP.

Clinical mobility solutions are ideal technologies to leverage for care coordination into the community because of their rapid adoption among clinicians. Indeed, according to the 2nd Annual HIMSS Mobile Technology Survey, which was released in December 2012, 93 percent of physicians already use mobile health technology in their daily activities and 80 percent use it for patient care. While 51 percent of the HIMSS Media survey respondents indicated that their healthcare organization was deploying a new EMR as a new technology to help them meet healthcare reform initiatives, 59 percent and 54 percent identified clinical devices and mobility solutions, respectively, as recent acquisitions targeted to meet compliance (Figure 2).

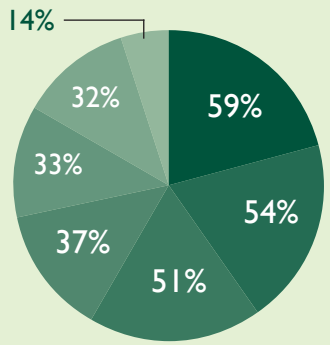
"Recognizing not only these adoption trends but the fact that there are third-party app providers with whom some healthcare organizations wish to partner, Philips is developing its own applications as well as entering into partnerships with third-party vendors to develop health apps for mobile devices," noted Olivia Hecht, Senior Manager for PCCI Platforms and Technology. Philips developed the IntelliVue Mobile Caregiver app to allow clinicians to access information from Philips' IntelliVue Patient monitoring systems via their iPad or iPhone – which enables them to access information wherever they may be.

Through Philips IntelliSpace Event management software, clinicians can receive notifications and alerts on their mobile devices – a concept that is being widely embraced by clinicians and patients. As survey results show, hospitals and health systems already recognize the value of clinical devices and mobile solutions. These types of solutions may help hospitals and health systems effectively and cost-efficiently extend their clinical capabilities outside of traditional care locations, allowing for any change in the health status of their patients to be proactively handled to prevent potential hospitalizations or re-hospitalizations.

In a strategic partnership, Philips Healthcare and AirStrip Technologies have collaborated to link AirStrip's clinical mobility solutions to the Philips IntelliVue Information Center, a real-time central monitoring system, which will give clinicians easy access to patient information aggregated by the mobile apps.

Figure 2:

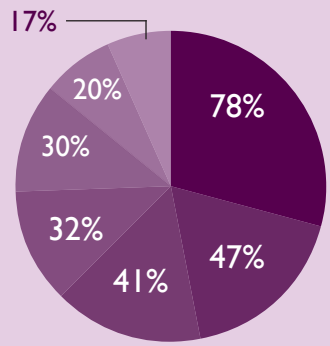
What new technologies are you deploying to meet healthcare reform initiatives? (Select all that apply.)



59%	Clinical devices
54%	Mobility solutions
51%	New EMR
37%	Home/telehealth technologies
33%	Early warning systems (clinical)
32%	Remote monitoring solutions
14%	Other

Figure 3:

Identify external entities to which you are deploying your IT systems to address healthcare reform requirements. (Select all that apply.)



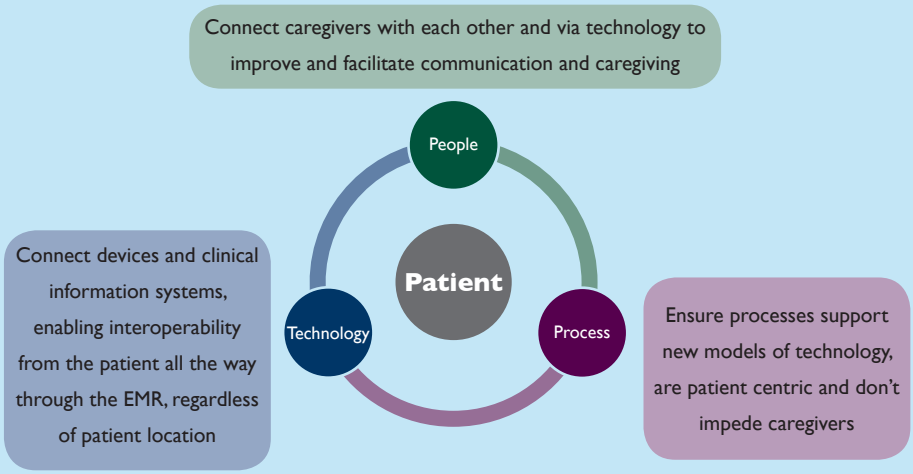
78%	Physician office
47%	Ambulatory surgery center
41%	Diagnostic imaging center
32%	Urgent care center
30%	Patient home
20%	Other
17%	EMT services

"Two thirds of the annual $2.8 trillion healthcare spend occurs in the outpatient environment and 56 percent of this is personnel related. To bend the cost curve, healthcare organizations will have to utilize technology, to leverage resources and people."

– Brian Rosenfeld, CMO for Philips' Telehealth Solutions

Figure 4:

The concept of connected care puts the patient in the center, with clinical IT systems supporting people and processes.



Anticipating greater adoption of telehealth

Hospitals and health systems are also deploying other solutions such as home/telehealth technologies to help them coordinate care, with 37 percent of survey respondents confirming their use to meet healthcare reform initiatives. Thirty-two percent of survey respondents identified remote monitoring solutions as another technology they are acquiring to meet healthcare reform initiatives (Figure 2). Hospitals and health systems have also recognized that remote monitoring solutions are a cost-effective way to manage patients outside of the outpatient setting. With the number of U.S. residents using telehealth services projected to reach nearly 1.3 million by 2017 – a nearly sixfold increase over 2012 rates, according to market research firm IMS Research, healthcare providers are preparing to meet this rising demand. Philips has already anticipated the rise in adoption and the challenges ahead. Philips' Hospital to Home Telehealth Solutions deliver scalable offerings to meet the needs of a healthcare enterprise's size and budget – connecting clinical teams from remote facilities regardless of location and distance, to deploying a full Enterprise Telehealth Platform that supports various settings including the home, hospital and other care facilities.

"Two thirds of the annual $2.8 trillion healthcare spend occurs in the outpatient environment and 56 percent of this is personnel related," said Brian Rosenfeld, CMO for Philips' Telehealth Solutions. "To bend the cost curve, healthcare organizations will have to utilize technology, to leverage resources and people." Hospitals and health systems will need both technology and expertise to remotely manage intensive care units, patients on the medical and surgical floors and patients in their homes. Leveraging resources and people requires decision-support tools that extract data elements from clinical systems such as HIEs, EHRs, and PACS to enable clinicians in remote locations to obtain actionable information, according to Rosenfeld (Figure 4).

Finding the right clinical IT partner

Survey respondents ranked interoperability with existing EMR (42 percent), deep clinical knowledge (32 percent) and interoperability with existing clinical information systems (22 percent) as the most important attributes of a successful clinical informatics vendor (Table 3). Hospitals and health systems recognize that in order to become the new healthcare enterprise they need a clinical IT partner who has the robust capabilities to help them meet all healthcare reform initiatives. For clinical technology consulting engagements, survey respondents ranked depth of subject matter expertise (47 percent) and proven methodology (43 percent) as their top priorities (Table 4). With deadlines for multiple healthcare reform initiatives looming, hospitals and health systems do not have the in-house expertise or time to meet compliance on their own.

By choosing a trusted clinical IT partner who has both the right solutions and services, hospitals and health systems – especially those with financial and resource constraints – can cost-effectively achieve healthcare transformation. "Our proximity to the patient provides us with deep clinical knowledge because we are the providers, the analyzers and the interpreters of near patient high-resolution data and we support interoperability with information that is further away from the patient's immediate setting such as demographics and diagnosis and other data in an EHR and other clinical systems," Frassica said. "As a result of our broad and deep set of solutions, we can exceed survey respondents' expectations of a clinical informatics vendor with whom to partner in today's healthcare environment."

By partnering with Philips, hospitals and health systems can tap into its broad and deep resources, including Philips Research, which deploys technology to introduce meaningful innovations in health and well-being in both developed and emerging markets. Its state-of-the-art research puts CIOs and IT departments ahead of the curve, which is especially critical

Table 3:

Please rank, in order, the following attributes of a successful clinical informatics vendor, with "1" being the most important and "5" being the least important.

Rankings of attributes of a successful clinical informatics vendor	1	2	3	4	5
Deep clinical knowledge	32%	18%	30%	18%	1%
Frequent content update/technology refreshes	8%	16%	23%	50%	4%
Interoperability with existing EMR	42%	25%	18%	9%	6%
Interoperability with existing clinical information systems	22%	41%	21%	14%	1%
Other	10%	3%	6%	4%	77%

Table 4:

Please rank, in order, the top three priorities ("1" being of highest priority and "3" being of lowest priority) for clinical technology consulting engagements. Leave all others blank.

Priorities	1	2	3
Price	30%	33%	36%
Depth of subject matter expertise	47%	32%	21%
Customer references	11%	37%	53%
Proven methodology	43%	31%	27%
Prior engagement	33%	39%	28%
Other	80%	0	20%

as meaningful use advances beyond Stage 2 and challenges healthcare providers to do more with healthcare IT.

Healthcare reform will continue to evolve, and healthcare transformation promises to be an ongoing exercise for the industry as it transitions from pay-for-volume to pay-for-value, from spiraling costs to cost efficiencies, from episodic care to collaborative care, and from reaction to prevention and well-being. The new healthcare enterprise promises to be patient-centric, providing connected care that enables care anywhere for both healthcare providers and their patients. Transforming healthcare, or any field, requires shifts within technology, people and processes. By creating a patient-centric environment that connects not only enabling technologies – from the devices for the patient through to the EMR and caregivers – but also people and processes together, healthcare organizations can realize the full benefits of the new healthcare enterprise (Figure 4).

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