

Digital Care Management: Building a Healthier Future

Bridge Gaps, Improve Outcomes



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Gartner

Executive Summary

Globally, healthcare costs are rising faster than countries' ability to meet them. Among all nations, the U.S. is experiencing a much faster rise. "Almost 17% of the U.S. GDP is consumed by healthcare costs and this is expected to further increase to 20% by 2020."¹ Despite the rising healthcare spends, the quality of outcomes is not proportional.

While some countries are 'rationing healthcare' and setting 'price mechanisms' to control costs, the U.S. hopes to drive down spiraling costs through its Affordable Care Act. Making health insurance mandatory ensures health services access to all and programs like Medicare Shared Savings Program (MSSP) offer incentives for providers to manage overall health instead of just providing piecemeal services.

The traditional, reactive approach to cost management has several shortcomings. The primary one being: retrospective identification of top percentile members, which is done only for the high medical spend members. However, there is no assurance that the same people will be in the top percentile in subsequent years.

By adopting new digital technologies payers and providers can foster a proactive approach in healthcare delivery. For example, they can leverage Big Data, predictive analytics and multi-channel reach for identifying top spenders based on activity and clinical data; and designing programs that address gaps in care and anomalies in patient behavior. Digital platforms can further deliver these programs at scale to a member population beyond top spenders.

In this paper, we will discuss analytical models for identifying inefficiencies in care delivery and patient behaviors. It also delves into the digital platforms that can deliver, track and refine personalized care programs based on member behavior.

Burgeoning Costs: The Drivers

Health Plans have noticed considerable churn in the top percentile of their medical spend members. For example, Intermountain Healthcare observed the below when analyzing their "hotspotting patients"²:

- Top 1% of the patients used 24% of the total amount spent on patient care between 2008 and 2012.
- 5% of the patients consumed almost 51% of our total costs over the same time period.
- Less than 10% of the top 1% of high-cost patients remain in that category the following year, and less than 0.5% of these same patients remain in that category for five consecutive years.

In addition to the above, there are significant inefficiencies in care delivery due to various care gaps and typical patient behavior patterns. Overall, of the USD 90 billion spent on spine related care, USD 7.5 billion goes waste.³ Non adherence by patients to therapy results in over USD 100 to USD 289 billion in wasted spends. Poor adherence to medication is responsible for 33% of expenditures related to hospital admissions, and treatment failure in 30-50% cases each year causes 125,000 deaths.

FIGURE 1 Changing Population – Across Years



Source: HCL

Medication adherence is a bigger issue for senior patients and those with chronic conditions. It is expected that by 2020, the number of people having at least one chronic condition will reach 157 million.

Healthcare delivery organizations must develop programs that address emerging needs of their patients. A Gartner report⁴ points out that such programs based on connected digital platforms aim to:

- Reduce medical errors
- Increase care quality
- Improve financial results
- Optimize costs
- Meet governmental regulations
- Improve the patient experience
- Meet consumer expectations
- Satisfy compliance mandates
- Ensure privacy and security

Interestingly, the report also stresses that “healthcare delivery will become more coordinated, collaborative, measurable and centered on the patient – more of a team effort, with the patient as an active participant.”

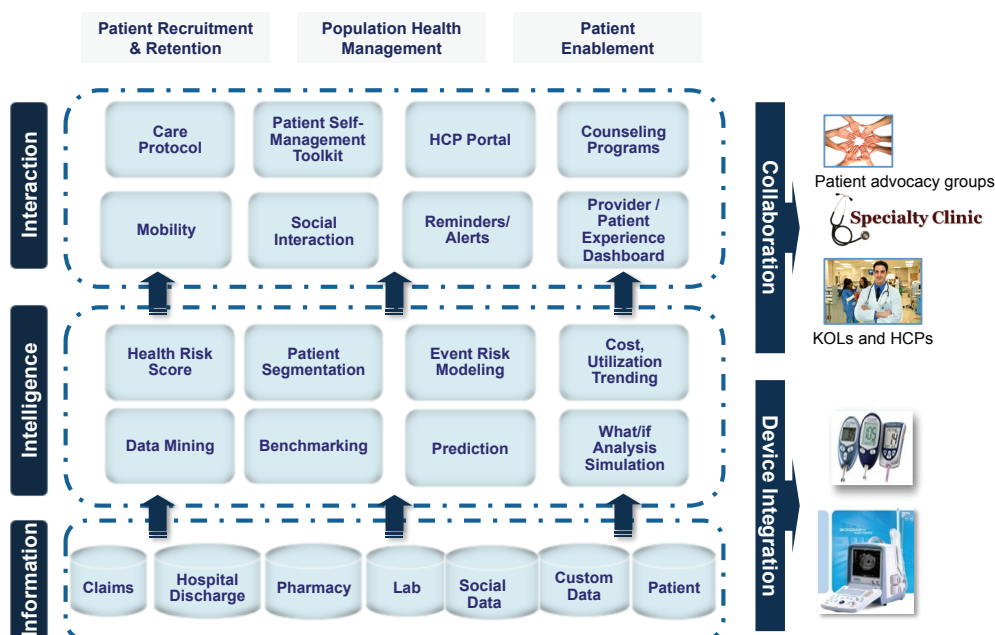
The Way Forward: Patient-Centric Digital Care Management

Digitalization of care delivery will be a disruptor in containing healthcare costs as seen above. An approach to Digital Care Management based on HCL's 3I Platform is shown below:

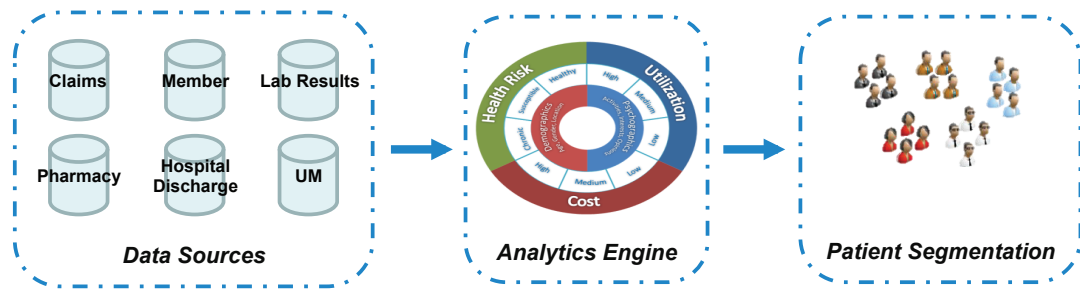
The platform leverages open data sources and custom data to develop a set of intelligence protocols basis which business services like patient enablement are delivered through a multi-channel infrastructure. Integration with personal medical devices allows for self-care monitoring and management.

1. **Information Layer:** Identifying the target segment requires a detailed understanding of the population. Therefore, it is essential that data from multiple sources like medical claims, pharmacy claims, lab results, medication administration records, electronic health records and social media is collected. Further, this collected data is harmonized to a format that an analytics engine can use.

FIGURE 2 Patient Enablement – 3I Framework



Source: HCL

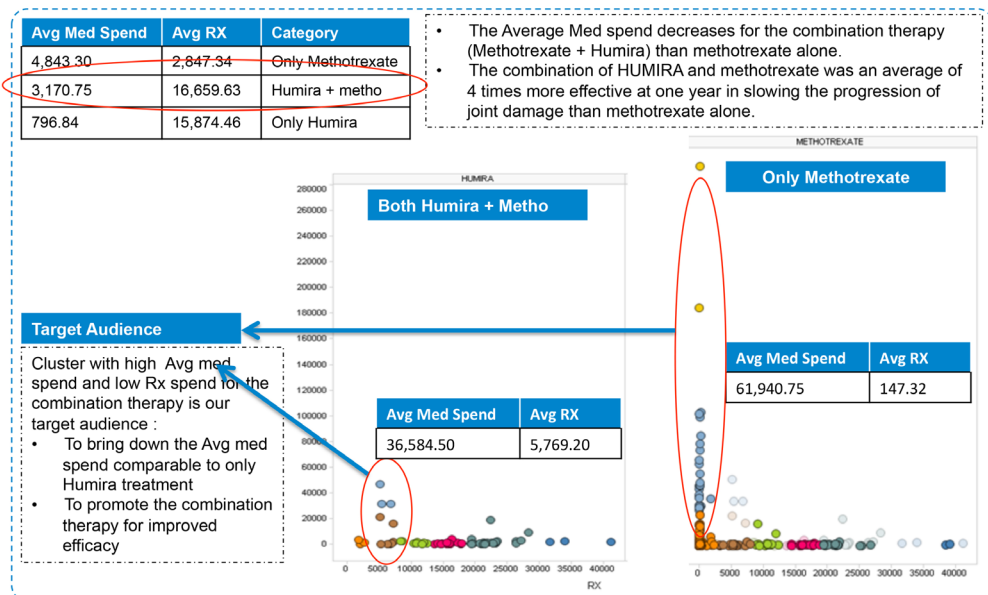
FIGURE 3 XTP Technologies: Risks and Rewards

Source: HCL

2. **Intelligence Layer:** Studying the behavior pattern of the target segments is important. Rules-based analytics is run on the population data to understand trends and behavior with focus on high-risk patients, high-medical spend patients, and on a combination of Health Risk, Utilization and Cost (HUC score). Utilization and cost are compared with benchmark measures for various segments to identify outliers. Models are then built to predict events like re-hospitalization and preventable hospitalization, behaviors like medication intake and therapy adherence. Program effectiveness is also tracked through A/B experimentation and tracking results.

There are several inefficiencies in healthcare delivery that must be understood. We, at HCL Technologies, did a study on payer claims data for patients with osteoarthritis to identify and understand such inefficiencies and were able to gain several interesting insights.

Osteoarthritis (OA) has a high prevalence and associated healthcare costs in the U.S. are significant. The total affected population size for the study was 14,640 patients with medical spends of over USD 50 million and outpatient Rx spends of over USD 22 million. By detailing the spend distribution for the entire population, some unique members were identified. The top 10% of the members contribute to 87% of overall medical costs but only 10% of overall Rx costs.⁵

FIGURE 4 Illustration: Rheumatoid Arthritis

Cluster with high average medical spend and low Rx spend for the combination therapy is our target audience.

Source: HCL

Appropriate and adequate pain management is crucial in the treatment of osteoarthritis. Identification of patient behavior that is responsible for inefficiencies in outcomes becomes important to reduce care costs. Based on the measures of a study conducted by an expert clinical panel, PAIN (Patient Population Assessment to Identify Need), the following inefficiency measures were identified in the target population:

Inefficiency Measure	Total Cost	Per Member Cost
Gastrointestinal Complications: Patients who used NSAIDs/COX-2 inhibitors and required hospitalization or surgery or an upper-gastrointestinal endoscopy in any setting	\$ 30,200 (11 Members)	\$ 2,745
Pain related injections: One or more somatic or sympathetic nerve block or destruction administered by a PCP	\$ 69,031 (294 members)	\$ 235
Under-Medication: Patients who received no NSAIDs, COX-2 or Opioids and with no inpatient stay, however incurring high outpatient costs	\$ 2,420,916 (250 Members)	\$ 9,683
Pain-related ED visits: An ED visit with a primary diagnosis for OA or an inpatient hospital stay with length of stay <1 day	\$ 168,987	\$ 15,362
Excessive Office Visits: Eight or more office visits within an OA diagnosis within a span of an year	\$ 404,317	\$ 17,579
Opioid Abuse: One or more diagnoses of opioid abuse or dependency (ICD-9-CM 304.0x, 304.7x, 305.5x, or 965.0x, excluding 965.01)	--	--
Implantable infusion pump: Any procedure related to the insertion, repair, removal, or replacement of an implantable infusion pump	--	--
Repeated OA related surgical procedures: Two or more of the same OA or LBP procedures	--	--

The study amplifies the need to identify inefficiencies in care delivery through systematic and detailed analysis. The gaps which become evident must then be addressed, leading to better health outcomes and reduced cost of care.

3. Interaction Layer: After identification of the target segment and designing a customized care plan for handling inefficiencies in patient behavior, the next important step is program delivery. The current development of the 'Internet of Things' as a digital network for Real-Time Healthcare Systems (RTHS) is paving the way for the effective delivery by increasing the touch points for patients.

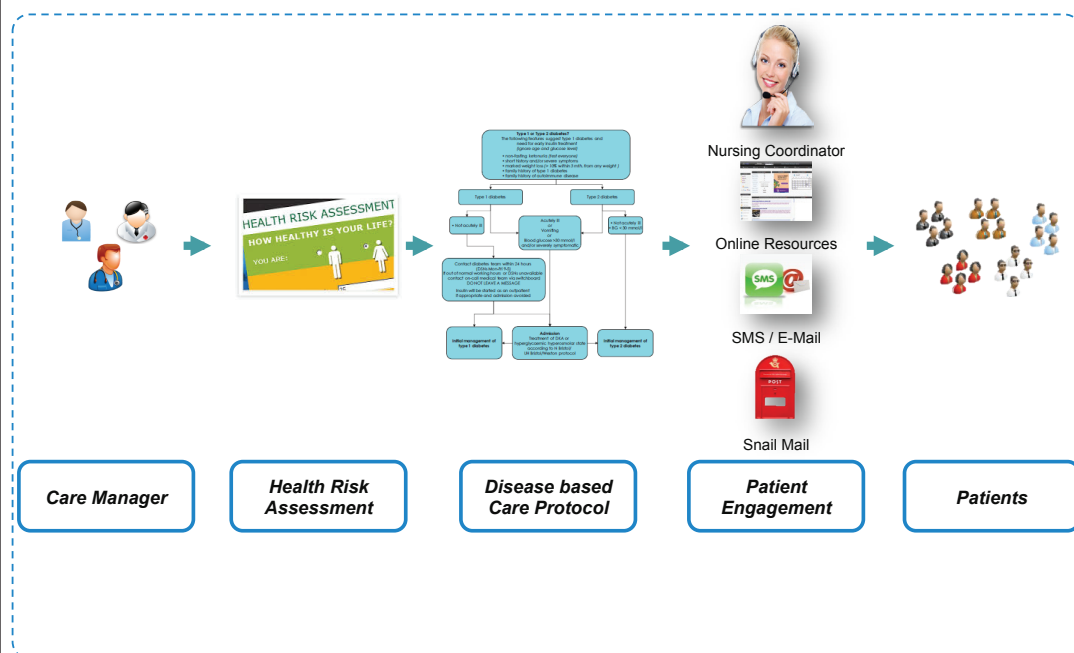
Patients are on-boarded through by assessing their health conditions. Subsequently, tasks are triggered for the customized care to be provided across a Patient Journey Map (PJM). These include steps such as health education, medication, diet therapy, psychological intervention, exercises and self-diagnostic tools. Regular reassessment and adjustment of the care plan is done based on the group's characteristics. At the end of the program, patient surveys are done to derive satisfaction scores.

This Patient Engagement Program (PEP) empowers the patient by providing shared decision making capability and educating/coaching them about their condition.

Unleash the Power of Data and Automation for Improving Healthcare

New automation tools and platforms are available which can cater to the various needs of healthcare organizations in meeting patient needs. It establishes better communication between patients and healthcare professionals and thus, ensures effective patient management through appropriate channels.

The automation tools create reminders for appointments, prescription refills and health checkups. The reminders are prompted by patient data extracted from secure Patient Management Systems and EHR disease protocols. Such collaborative tools and automated monitoring systems enhance the care co-ordination across the healthcare system and provide smooth transition of the patient—right from admission in the hospital to after they are discharged.

FIGURE 5 Care Delivery through Population Health Management

Care Manager assigns a Patient to a pre-defined Disease Protocol based on Disease condition, stage and need for a Care Protocol

Patient is supported by a Care Protocol administered through multiple channels and is provided online resources/toolkits for self-managed care

Source: HCL

Conclusion

The change in Healthcare, especially with the increase in aging population and growth in chronic and lifestyle related problems, has redefined the requirements from payers and providers. Simultaneously, improvements in technology are empowering patients through online services, deeper collaboration and smarter diagnostic tools.

The use of sophisticated analytics and diagnostics tool sets the foundation for a digital platform for evidence-based therapeutics and a real time healthcare system. "At its core, the RTHS is about possessing the right information

at the right time and having the means to use it effectively.⁴" The digital care platform ensure that patients are more aware and informed about their care providers, about the implications of their conditions and their treatment regimes.

The healthcare industry is well-positioned to embrace the 'Internet of Things' that makes it possible to deliver – via email, SMS, instant messenger, mobile – accurate, targeted and customized care through RTHS. Eventually, care efforts could become unique to patients, allowing savings in time, money and improving benefits to patients.

Source: HCL Technologies

¹National Health Expenditure Projections 2010-2020, Centers for Medicare & Medicaid Services

²"Tackling the "Hotspotter" Patient Challenge", Scott B Pingree, HBR Blog Network, November 29, 2013

³"The Annals of Internal medicine", October 7, 2012, publication

⁴Gartner Inc., Strategic Road Map for the Real-Time Healthcare System, G00253192, December 19, 2013

⁵HCL Technologies Internal study on the All Payers Claims Database

From the Gartner Files:

2014 Strategic Road Map for the Real-Time Healthcare System

This Strategic Road Map offers healthcare delivery organizations a path to pursue compelling and transformational care delivery and business opportunities. Healthcare provider IT and clinical leadership can use this research to better understand the benefits, challenges and underlying technologies.

Key Findings

Above all, the real-time healthcare system (RTHS) is:

- **Aware** – Awareness is about providing visibility into important patient-related activities and event data to access the most recent and informed patient context to satisfy revenue, cost, quality and patient experience expectations.
- **Mobile** – Mobility contributes to better coordinated and optimized workflows and timely access to patient information, and is a defining characteristic of the RTHS.
- **Collaborative** – The RTHS will continue to extend its reach and influence across the inpatient, outpatient, long-term and home care settings.
- **Demanding** – The RTHS has a prodigious appetite for information and the IT resources necessary to handle, house, process and analyze information.

Recommendations

- Resist the temptation to adopt technology before the nature and scope of enterprise awareness, patient throughput, care quality, patient experience, and communications and collaboration requirements are adequately understood and set forth in strategy.
- Consolidate and standardize as much of the IT infrastructure as possible to enable the efficient collection of patient-related event and activity data.
- Introduce end-user experience monitoring, IT service management, operational best practices and robust business continuity to ensure the performance and availability of the

foundational and contributing systems critical to enterprise awareness.

- Make room in your budget for innovation and transformation by regularly decommissioning legacy systems. Use criteria that take into account the ongoing costs, contractual flexibility, and technical and compliance risks.

Strategic Planning Assumption

Through 2018, the effectiveness of the real-time healthcare system strategy will depend on the healthcare provider's ability to positively identify the patient within internal and external workflows and business processes.

Analysis

The modern healthcare delivery organization (HDO) includes a collection of software systems and technologies from many generations that are as much an impediment to progress as they are an enabler of progress. As the demands on HDOs increase, the role of IT decision makers and business leaders becomes one of navigator from the traditional fragmented operation to a digital healthcare operation that has increased awareness, integration and operational effectiveness. We refer to the set of IT capabilities needed for this future state as the real-time healthcare system (RTHS).

The RTHS springs from the societal need to improve care access and quality, and the practical need to optimize and personalize its delivery. The Internet of Things (IoT), the Nexus of Forces (mobile, social, information and cloud), and the convergence of informational and operational technologies (IT/OT) in healthcare have served to make all of this more possible. Each area brings its own set of capabilities and complexities to enable the new management and operating paradigms essential to success in the next-generation healthcare environment we expect to see – a "Healthcare 3.0" landscape where the lines between the provider and payer are rapidly blurring, and industry consolidation and market disruption by new entrants outside of healthcare are routine. The healthcare industry is being restructured before our eyes in response to pressing clinical and business realities and governmental reform.

The RTHS must support an increasingly mobile, connected, collaborative and remote healthcare workforce, and facilitate their use of medical knowledge and business intelligence to continuously optimize clinical and business processes in real time.

The IT Leader's Dilemma

HDO CIOs are constantly establishing, executing and dismantling run, grow and transform programs and projects (see "A Simple Framework to Translate IT Benefits Into Business Value Impact"). CIOs are spurred by new payment and healthcare delivery models, the desire for growth and revenue, reform and regulatory mandates, and evolving consumer preferences. The motivation also comes from familiar industry, societal and common-sense drivers, such as the desires to:

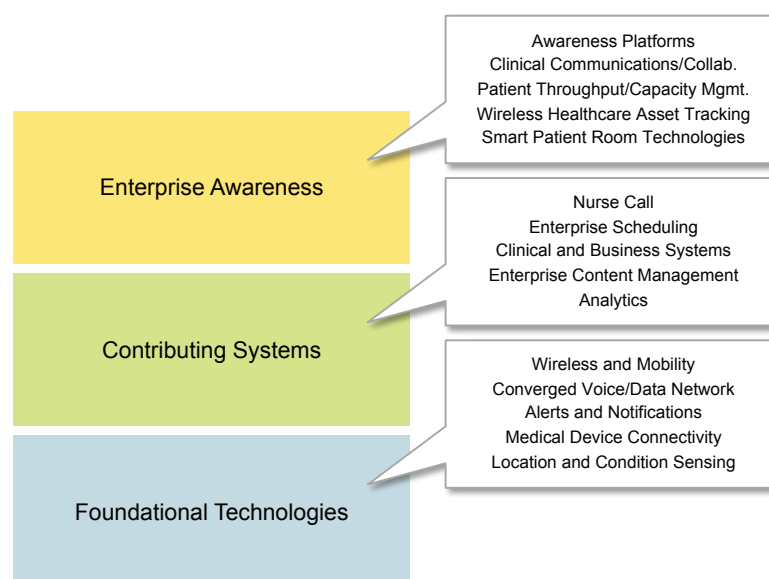
- Reduce medical errors
- Increase care quality
- Improve financial results
- Optimize costs
- Meet governmental requirements
- Improve the patient experience

- Meet consumer expectations
- Satisfy compliance mandates
- Ensure privacy and security

Gartner has observed that HDOs have often implemented many systems and technologies as stand-alone programs or enhancements to existing capabilities – but have come to realize that a new approach or vision is needed to navigate the future. The ultimate value of IT is always measured in the business value it creates and enables. To be successful in the digital healthcare era, technology decision makers must frame the journey with a Strategic Road Map that aligns critical software systems and technologies to achieving tangible results in managing and delivering healthcare. This Strategic Road Map defines the RTHS, connects technology capabilities (see Figure 1) to business results, and illuminates a pathway for navigating to a digital healthcare future.

The RTHS is the natural byproduct of a fluid and fast-paced, complex, and largely uncoordinated care delivery system that increasingly has seen the need to make informed decisions and process adjustments in real time. Healthcare delivery will necessarily become more coordinated, collaborative, measurable and centered on the patient – more of a team effort, with the patient as an active participant.

FIGURE 1 Building Blocks for the Real-Time Healthcare System



Source: Gartner (December 2013)

The Internet of Healthcare Provider Things

The RTHS narrative surrounds the inevitable transformation of the HDO into an enterprise that is more patient-friendly, transparent, accessible and efficient, and whose reach could ultimately make care more convenient and affordable for the consumer. This will require that new and existing parts of the healthcare system work together more effectively – converge, connect, interact, communicate and collaborate better than they ever have in the past.

Gartner defines the Internet of Things as the network of physical objects accessed through the Internet that contain embedded technology to sense or interact with their internal states or the external environment (see “The Internet of Things Is Moving to the Mainstream”). The IoT describes how the Internet is being used to bring together so-called “smart devices,” such as consumer devices, automobiles, city infrastructure and enterprise assets, so that these endpoints can be controlled or can originate and receive data from one another or from IT resources. When these devices (“things”), directly or indirectly, connect to the Internet, they become an extension of the enterprise.

New experiences, operating efficiencies and business models will arise and deliver new or enhanced value through the convergence and utilization of these “things.” The potential impact of the IoT on healthcare will be considerable. The IoT has been emerging for some time, with its origins in factory automation, machine to machine (M2M) interaction and embedded systems. Its impact will increase in the coming years as the costs of technology and connectivity fall, and interoperability standards make it more practical.

The RTHS is an example of the IoT in practice. At its core, the RTHS is about possessing the right information at the right time and having the means to use it effectively. To successfully operate as an RTHS, HDOs will have to expand their use of location- and condition-sensing technologies, communications and collaborative tools, integration, embedded technologies, interoperability standards, and mobile devices (see Figure 1). They will have to be able to use this information to optimize the management and execution of their most critical clinical and business workflows and processes in real time. The RTHS represents an IT and operational

paradigm that uses up-to-the-minute information to reduce response times, introduce efficiencies, adjust priorities and balance resources with demand to improve service levels. This approach will be required to meet future standards of care and patient experience expectations and remain strong in competitive markets.

The RTHS is dependent on and advanced by the Nexus of Forces, which is the convergence and mutual reinforcement of four interdependent trends – social interaction, mobility, cloud and information (see “Engage, Learn, Create and Disrupt With the Nexus of Forces”). These forces combine to empower individuals and enterprises in new and unexpected ways. HDOs will begin to harness the power of the nexus to engage consumers and their patients and staff, extend the reach and capabilities of their IT infrastructures, and better understand and satisfy the needs of the constituents. The nexus is likely to dislodge many long-held beliefs in how IT is structured and delivered and enables the HDO.

IT/OT is an example of yet another convergence that will enable the RTHS – that of information technologies with operational technologies. For a long time, most enterprises maintained separate technology stacks, accountability and governance structures for informational technology (IT) and operational technology (OT). This was due to historical operations responsibilities and highly specific computing platform needs that separated information computing from operational computing. Operational systems deal with the actual running of equipment or are used to manage and control mission-critical production or delivery processes. OT systems are often built to exacting industry specifications and have associated regulatory requirements. Medical devices and patient-monitoring equipment are the most salient examples of IT/OT convergence in action within the HDO. Their contribution to the RTHS increases significantly as they become more mobile, intelligent, integrated and connected.

The RTHS must support an increasingly mobile, communicative, collaborative and remote healthcare workforce, and facilitate their use of medical knowledge and business intelligence to continuously optimize clinical and business processes in real time (see Figure 2). The RTHS represents what the HDO must become to satisfy the needs of the consumer, patient and marketplace.

FIGURE 2 Strategic Road Map Overview for the Real-Time Healthcare System

Future State	Current State	
• Situational and contextual awareness • Patient-centered • Pervasive access and sharing of patient information • Sophisticated operational management • Systems integrated/ interoperable via standards • Communication and collaboration conducted via mobile BYOD • Content searchable at an enterprise level • IT responsive and highly available • Social media larger part in patient engagement • Cloud a component of IT service delivery model • Sophisticated consent management • Strong positive patient identification • Value, quality and transparency orientation • Operationally predictive	• Limited enterprise awareness • Interfaced systems • Limited sharing of PHI • Information siloed • Disjointed workflows and processes • Systems in support of the clinician and back-office • On-premises IT • Departmental document management • Inadequate business continuity and disaster recovery contingencies • Nursing staff underserved by IT • Use of social media limited • Cloud adoption low • Mobility not fully governed or managed • Significant amount of unsanctioned BYOD • Fee for service mentality • Operationally reactive	Gap • Enterprise awareness • Mobile communications and collaboration • Patient-facing IT • End-to-end user monitoring • Positive patient identification • Consent management • Legacy decommissioning • Application support • Business continuity Migration Plan • Consolidate • Standardize • Automate • Instrument • Integrate • Extend • Monitor • Decommission

Source: Gartner (December 2013)

Future State

Awareness

At a minimum, the RTHS is acutely aware. The RTHS ensures that the information necessary to deliver care in a safe and timely manner is readily available at the point of care – along with the information to support evidence-based medicine and clinical decision support. It operates in the here and now, and generates enterprise event and patient activity data that can be acted on. This information is pivotal to coordinating and controlling the overall behavior of the RTHS – to realize the promise of accountable care and other initiatives directed at improving quality, outcomes and process efficiencies aimed at lowering costs.

To operate successfully in the here and now, HDOs need to increase their situational and contextual awareness surrounding the patient, and their understanding and use of event and patient activity data. HDOs will also need to

expand their use of automation, instrumentation, presence, and location- and condition-sensing technologies; event-driven and service-oriented approaches; messaging and other interoperability techniques; wireless; and mobility. Most importantly, they must re-engineer, adapt and integrate a host of workflows and business processes to leverage awareness.

Awareness is achieved by exchanging, aggregating, correlating and analyzing key enterprise event and patient activity data in real time. Working together, these systems provide the real-time intelligence necessary to balance workload and resource demands and to improve efficiency and outcomes.

In the RTHS, systems such as alerts and notifications and medical connectivity platforms increase awareness by integrating medical devices and patient-monitoring equipment with advanced clinical systems and nurse call applications. Wireless networks and mobile apps extend the reach of expensive clinical systems

to the point of care and make it possible for clinicians to consider and act on information quickly. Patient portals and self-service kiosks and interactive patient care systems engage the patient as part of this collaborative IT ecosystem. Home and mobile health monitoring enables faster intervention in the care of certain groups of patients, and they position the HDO for better care coordination and management across all care venues.

Context

The RTHS requires up-to-date context – not just access to content. Context is an important part of overall enterprise awareness. Context is the convergence of all types of information – awareness, structured and unstructured data – surrounding the patient.

Document management and imaging (DMI) is well-established within HDOs – they often have many DMI systems in place related to their various administrative, business and clinical departments. Unstructured data, such as scanned documents, reports, notes, medical images and office documents, represents a significant portion of the medical record – the natural byproduct of most hospital workflows. There is an increasing need to organize all of this patient-related unstructured data around the electronic health record (EHR). HDOs should view enterprise content management (ECM) as an enterprisewide information infrastructure that will support multiple business and clinical applications and workflows. An enterprisewide approach to managing content is relatively new to the HDO but is an important capability of the RTHS.

HDOs should take inventory of their various document and content management systems. HDOs that have unstructured content stored on file servers and in niche departmental DMI systems have an opportunity to identify and manage this content at an enterprise level and more easily integrate it with their mission-critical workflows and provide the necessary patient context for the RTHS.

Mobility

Along with the EHR, mobility is one of the most transformational technologies in healthcare. Clinicians are at the vanguard of mobility – particularly in areas such as access to medical knowledge and evidence, peer communications and collaboration, and extension of the EHR functionality's reach.

The mobility movement is a juggernaut and is a defining characteristic of the RTHS.

It is being fed by the practical convergence and convenience needs and desires of consumers, patients and providers. Used appropriately, mobility contributes to a streamlined and collaborative clinical workflow and timely access to patient information. Devices are continually moving closer to the point of care, and wireless and mobility are used to extend the reach of expensive and critical clinical and business systems. With handheld devices like tablets and smartphones, a clinician no longer has to rely exclusively on a bedside terminal, a computer on wheels or a stationary workstation to view patient information. Handheld mobile devices can serve many purposes – results viewing, ordering, e-prescribing, charge capture, vital-sign entry, dictation, reference data access, remote monitoring and Internet access.

With increased coverage, security and integration, Wi-Fi and cellular will continue to have a profound effect on how and where care is delivered, and from where patient information is accessed. Smartphones are increasingly used to support users within the HDO who would benefit from more-robust bidirectional communications and collaboration. Medical mobile solutions offer hands-free voice communications; secure texting and critical messaging; the management of mobile alarms, alerts and notifications from patient-monitoring devices; nurse call integration; the communication of critical values from EHRs and other clinical systems; and call center integration over all major mobile device platforms.

Mobility will be used more and more to engage, inform and care for the patient as part of the RTHS. Mobile extensions to patient portals, the use of conventional SMS and secure messaging between providers and patients, mobile health apps to encourage health and wellness, and mobile health monitoring for faster interventions will be just a few ways in which mobile devices will have a greater impact. Gartner believes that substantive improvements in clinical quality, along with lower costs, can be accomplished if patients are more involved in their care, and mobility makes this easier and more likely (see “Top Actions for Healthcare Delivery Organization CIOs, 2013: Be Aggressive About Implementing Patient-Facing IT”).

Efficiency

The ability to deliver higher patient throughput at a lower usage and cost is key to evolving toward the real-time health system. This kind of operational efficiency can be achieved by providing real-time, hospitalwide visibility into

operations, patients, resources and analytics. There is still considerable work to be done to make hospitals more efficient – to eliminate waste, squeeze the latency out of workflows, accelerate business processes, and maximize the use of assets and human resources by optimizing patient throughput. Patient throughput and capacity management (PTCM) systems offer the potential to significantly improve patient flow and resource usage for complex HDO workflows and processes and, consequently, the patient experience (see “Hype Cycle for Healthcare Provider Applications, Analytics and Systems, 2013”).

Operational efficiency through increased awareness can help HDOs in several ways:

- Increasing patient throughput by accelerating bed turnaround time and by reducing the time needed to search for people or equipment
- Reducing costs by optimizing the utilization of assets, limiting unnecessary purchases, reducing loss and theft, and performing maintenance and repairs in a timely manner
- Improving patient safety by identifying patients more accurately, intervening more rapidly when patients’ conditions deteriorate, and swiftly locating any malfunctioning devices or recalled or expired drugs
- Improving regulatory compliance through better monitoring, alerting and reporting

The introduction and integration of the information technology into complex clinical and administrative workflows and processes more often require re-engineering complex workflows and processes and overcoming the endemic resistance to change.

Capacity, Performance and Availability

The best application, system or IT service – regardless of how well-aligned with industry and societal needs – is of little value if it is not easy to use, responsive and highly available. One only has to witness the turmoil surrounding the troubled rollout of the U.S. Affordable Care Act’s website for health insurance market enrollment (HealthCare.gov) to understand that a robust, user-friendly experience is essential to acceptance and adoption.

A functional RTHS must support a host of applications, systems, platforms and devices, and consumes IT resources at a prodigious rate, not merely because it is real-time but also because it requires a significant amount of patient-related

information to be readily available. The RTHS itself generates large amounts of patient event and activity data necessary for situational and contextual awareness that must be acted on and stored.

The RTHS is made up of IT and communications infrastructure, systems, and technologies that must operate consistently and collaboratively at a very high level. The RTHS is dependent on the real-time infrastructure – one that is responsive and highly available with a very short recovery time objective (RTO). To ensure responsiveness, availability and recoverability, HDOs evolving to RTHSs will have to step up their game surrounding proactive service-level management, privacy and security, mobile device management, operational best practices (for example, ITIL), end-user experience monitoring, disaster recovery, and business continuity – and consider IT service delivery models, such as remote hosting and cloud services, to satisfy more-demanding service-level requirements.

Current State

HDOs, namely hospitals, are organized by service areas and departments. How they are organized is often a function of the type of hospital they are (community, critical access, academic, psychiatric, long-term care and so on); the size of the hospital; the patient population they serve; the specialties, subspecialties and service lines they offer; whether they are for-profit or not-for-profit, public, or private; their socioeconomics; whether they have a teaching or research mission; their prevailing culture; and other factors. Depending on its size and complexity, the average hospital has dozens, if not hundreds, of IT applications and systems.

Despite its increasing automation, the average hospital possesses limited enterprise awareness. The emphasis has been on capturing and reporting on information. Going forward, the emphasis will move toward sharing and using information to improve service and quality. HDOs have yet to adequately account for people, things and processes within the enterprise, and understand them in sufficient depth, and bring forth that insight to continuously improve HDO business and clinical workflows and processes. While HDOs are increasingly adopting location- and condition-sensing technologies, they are uncertain which technologies are most appropriate for their enterprise use cases and how their systems can best leverage the event data that is generated.

A significant portion of HDO data resides in application and system silos and departmental

DMI systems, and is more often interfaced rather than integrated. This, in part, accounts for the difficulty of gaining access and sharing patient information even within the walls of the HDO and presages larger health information exchange (HIE) difficulties.

In addition, mobility within the HDO is not fully governed or managed. The clinical staff engages in a significant amount of unsanctioned bring your own device (BYOD), while the nursing staff is underserved by sanctioned mobile BYOD devices.

Most IT systems are in support of back-office, patient management, financial and administrative functions, and the majority of systems that support care delivery are aimed at the clinician. Patient-facing IT, such as patient portals and interactive patient care, has just begun to take hold due to healthcare reform and quality initiatives and an even more recent focus on the patient experience.

Moreover, HDO IT services are predominantly delivered on-premises, and cloud adoption remains low. Disaster recovery and business continuity contingencies are more often inadequate from an RTO perspective to cover an increasingly large and diverse portfolio of applications and systems that also are increasingly interdependent.

Although nearly one-third of HDOs claim to be participating in some form of social media (see “Five Steps Healthcare Providers Can Take Toward Social Media”), their involvement is currently limited and mostly surrounds the establishment of strategy and policy.

Gap Analysis and Interdependencies

The delta between the current state of today’s HDO and the RTHS can be best characterized by the extent to which the HDO embraces the following:

- **Enterprise awareness** – Most HDOs are insufficiently aware of the state of the enterprise and the demands placed on their most important resources. Visibility into real-time location and condition intelligence will become increasingly vital to running an efficient and effective HDO, and to streamline disjointed workflows and processes and become more operationally predictive.
- **Mobile communications and collaboration** – Aside from the EHR, mobility is one of the most transformational movements in healthcare, and represents the new face of user engagement. HDOs globally are implementing secure text messaging for their clinicians. They will soon view secure messaging as a feature of a more comprehensive mobile communications and collaboration platform.
- **Patient-facing IT** – As an industry, only recently has it begun to deploy IT in support of the patient. HDOs will begin to implement tools, such as intelligent scheduling, patient documentation and patient decision support, not just simple portals, for results reporting to enable shared decision making.
- **End-user experience monitoring** – HDO IT leaders are often unaware of the health of their IT infrastructures and where potential performance bottlenecks or risks to availability reside. Application performance management tools and associated best practices make it possible to reduce unplanned downtime, improve overall system availability and responsiveness, and thereby, enhance patient safety and physician satisfaction.
- **Positive patient identification (PPID)** – PPID is essential to patient safety and improved outcomes and contributes to a positive patient experience. Once a patient has been positively identified, all subsequent encounters and related workflows become safer and more efficient.
- **Consent management** – Patients and consumers are concerned about the confidentiality of their protected health information. HDOs (and HIEs) should capture consumer preferences using consent management tools suitable for automation, and apply those preferences systemwide.
- **Legacy decommissioning** – HDOs must take every opportunity to reduce the amount of legacy data they maintain. Legacy data that can be legitimately removed from the enterprise storage fabric should be deleted during decommissioning. Data that no longer has immediate value to the enterprise (based on policy) contributes to unnecessary storage growth, storage-related spending and e-discovery risks.
- **Application support** – IT is moving away from a help desk mentality toward one of service delivery. The IT service desk has become the home for all incident and problem management requests, and has taken on

more of an end-to-end view of service that is sensitive to business requirements, end-user service-level expectations and customer satisfaction concerns.

- **Business continuity** – Foundational programs that support disaster recovery and business continuity, such as performance and availability, end-user experience monitoring, information life cycle management, disaster recovery, privacy and security, and legacy decommissioning, should be enhanced to represent the real-time and demanding nature of the RTHS.

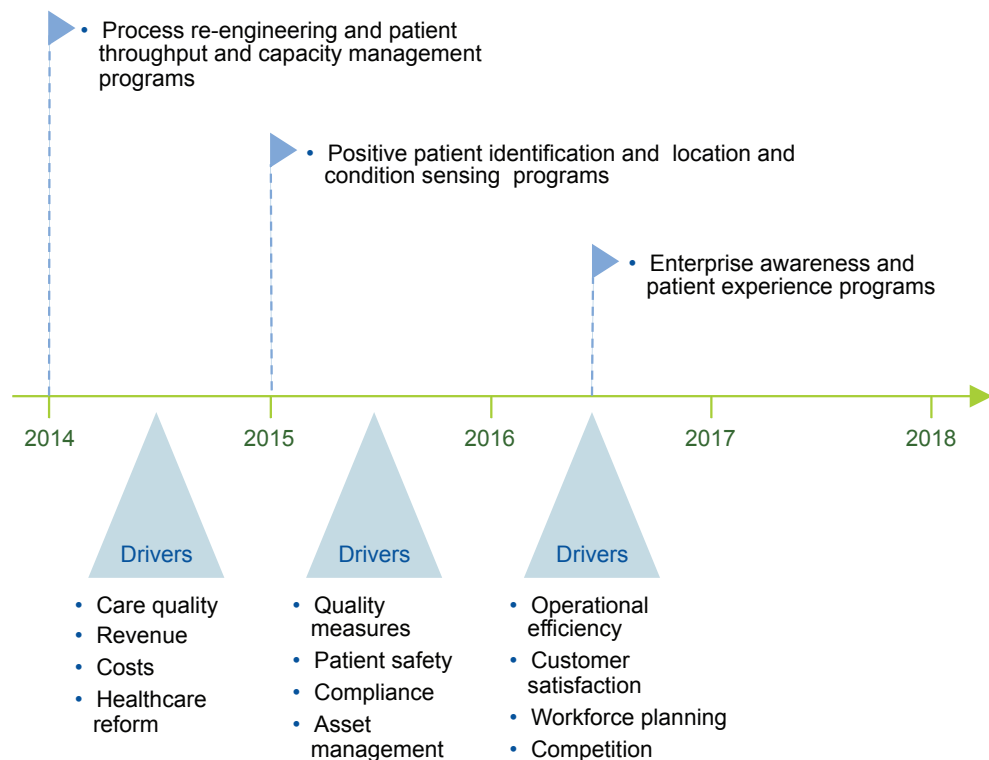
Migration Plan

Supporting the evolution to the RTHS requires sound requirements and use cases, process re-engineering, new and enhanced IT, and supporting infrastructure. Moving off the status quo requires implementing new programs surrounding IT consolidation, standardization, automation, instrumentation, integration, performance monitoring and system decommissioning, and extending the reach of IT into new venues of care (see Figure 3).

Higher Priority

- **Process re-engineering** – A clear and comprehensive understanding of the most important requirements and use cases that contribute to operational efficiency, care quality and a positive patient experience forms the basis for an effective process re-engineering program. Resist the temptation to adopt technology before enterprise awareness, patient throughput, care quality, patient experience, and communications and collaboration requirements are adequately understood and set forth in strategy.
- **Patient throughput and capacity management** – PTCM represents more-sophisticated thinking about patient management concepts and moves away from simple process or occupancy single-point support. PTCM includes the means to analyze patient flow, anticipate downstream demand, monitor and alert to progress against clinical pathways, and adjust in real time to changing circumstances.

FIGURE 3 Strategic Road Map Timeline for the Real-Time Healthcare System



Source: Gartner (December 2013)

Medium Priority

- **Positive patient identification** – PPID is fundamental to patient safety, compliance and improved outcomes. Focus on use cases that, first, enhance patient safety and then improve the patient experience. Separate location- and condition-sensing requirements from PPID requirements.
- **Location and condition sensing** – Location- and condition-sensing technology application platforms provide a flexible, scalable enterprise solution that accommodates a wide variety of applications leveraging sensor technologies and wireless networks within the physical locations of the HDO. Application examples include wireless healthcare asset management, temperature and humidity monitoring, hand sanitization monitoring, newborn location monitoring, and patient wander monitoring. Location- and condition-sensing technologies – with PTCM, bed management and nurse call – can work together to provide the real-time intelligence necessary to increase compliance, protect assets, and balance scheduling, workload and resource demands.

Lower Priority

- **Enterprise awareness** – Awareness platforms are fundamental to the RTHS, because they enable the HDO to monitor assets, people and events in real time. They also provide the HDO with the information needed to dynamically modify workflows and business

processes to improve efficiency, quality and regulatory compliance. Note: Since awareness is a key attribute of the RTHS, it should not be considered a low priority in the sense that it is less important. In the context of the Strategic Road Map timeline in Figure 3, awareness has been given a low priority because it must be preceded by other foundational tasks in order to succeed.

- **Patient experience** – The key to improving the patient experience is to treat patients like true consumers who have service and quality expectations that must be met to attract and retain their business. Patient experience IT initiatives include positively identifying the patient, providing a patient portal, deploying self-service kiosks, installing interactive patient care systems in patient rooms, introducing CRM, and hiring a chief experience officer (CxO).

Programs and projects, such as performance and availability, end-user experience monitoring, information life cycle management, disaster recovery, privacy and security, and legacy decommissioning, should be spread across the entire RTHS Strategic Road Map timeline. It would not be prudent to wait until the end of the Strategic Road Map to institute a robust business continuity program. While these foundational programs are critical to the success of the RTHS, they are not unique to the RTHS.

Source: Gartner Research, G00253192, Barry Runyon,
19 December 2013

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