

Hype Cycle for Healthcare Providers, 2021

Published 12 July 2021 - ID G00747564 - 121 min read

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Initiatives: [Healthcare and Life Science Digital Transformation and Innovation](#)

This Hype Cycle provides critical input for strategic planning by tracking the benefits and maturity levels of emerging healthcare provider technologies and approaches. CIOs should use this research to develop a roadmap and investment plan to optimize and transform.

Analysis

What You Need to Know

This Hype Cycle identifies, describes and analyzes technologies that will significantly influence and benefit healthcare providers. In 2021, we see widespread advancement of numerous digital innovations as COVID-19 recovery continues to drive providers to scale their business and clinical capabilities. Demands for care collaboration and coordination across the ecosystem are increasing the demand for real-time data, insight and workflow optimization and orchestration. Foundational technologies, such as interoperability, are maturing, enabling digital transformation, such as the realization of the real-time health system (RTHS).

The Hype Cycle

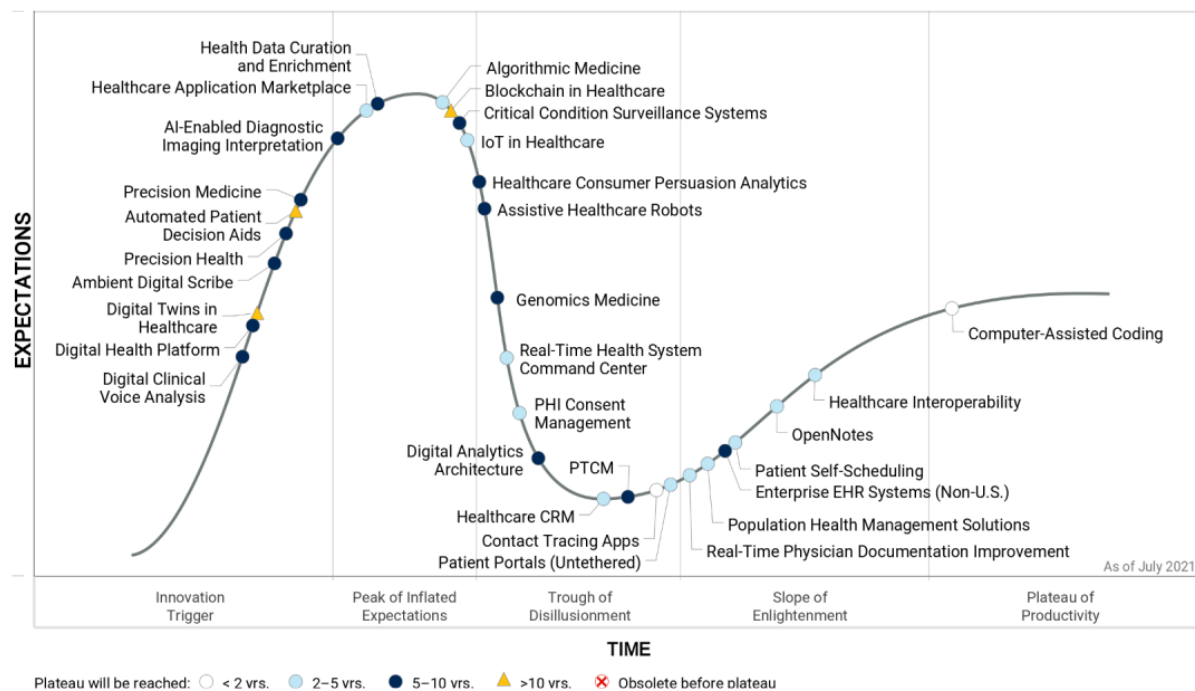
This 2021 Hype Cycle highlights the critical role of artificial intelligence (AI) and real-time data in transforming care delivery business and operating models as well as improving business agility. The sweeping cost cuts observed in 2020 are continuing, with further cost optimization and smarter IT spending. CIOs' emphasis is on technology-enabled medical cost reduction and quality improvement. For the next two years, the evolution of healthcare will be characterized by a reengineering of clinical care and operations around digital health and pervasive, real-time use of data and advanced analytics to achieve these goals.

We observe the following macro trends in 2021:

- Mature Hype Cycle technologies have laid the foundation for successful transformation to new operating models and RTHS. These include computer-assisted coding, healthcare interoperability, enterprise EHR systems (non-U.S.), and patient throughput and capacity management. Population health management solutions advanced to the Slope of Enlightenment in light of shifting focus on continuum of patient care, mainly driven by increasing value-based care reimbursements models globally.
- Innovations passing the peak will form the bedrock for future business and operating model transformation. These include blockchain and Internet of Things (IoT) in healthcare, critical condition surveillance systems, healthcare consumer persuasion analytics and genomics medicine. Additional capabilities driving digital transformation include digital analytics architecture for healthcare providers, real-time health system command center and healthcare CRM.
- Passing from the trigger to the peak, some innovations mark an era in which augmented intelligence and the application of AI capabilities enhance human decisions and actions with intelligence and speed. These include precision medicine, automated patient decision aids, ambient digital scribes and AI-enabled diagnostic imaging interpretation. Digital health platforms are accelerating toward the peak and adoption is expected to continue as providers embrace composability in their thinking, business and technical architectures.

Figure 1: Hype Cycle for Healthcare Providers, 2021

Hype Cycle for Healthcare Providers, 2021



Gartner

Source: Gartner (July 2021)

Downloadable graphic: Hype Cycle for Healthcare Providers, 2021

The Priority Matrix

The Priority Matrix is a companion to the Hype Cycle and maps a technology's benefit to its time to maturity. The Priority Matrix summarizes two key Hype Cycle take-aways:

- How much value will there be from a particular technology?
- When will the technology be mature enough to deliver that value at a manageable risk?

Investments that potentially have a high impact and a reasonable level of maturity are located at the top-left sections. Those that have lower benefit and a longer time to value are situated on the matrix's lower-right sections. Broadly speaking, if it's dark blue, it's hot — if it's gray, it's not.

This matrix reminds CIOs that more than half of these new technologies will reach the Plateau of Productivity in five to 10 years — with the vast majority having a high or transformational benefit. And most leverage AI, data and advanced analytics. Given current industry constraints and challenges, CIOs must guide stakeholders or business executives on their investment priorities. CIOs must mature their enterprise architecture (EA) practice and carefully sequence execution to address the interdependencies of pervasive need for data, analytics and real-time capabilities.

Table 1: Priority Matrix for Healthcare Providers, 2021

(Enlarged table in Appendix)

Benefit ↓	Years to Mainstream Adoption			
	Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
Transformational		Algorithmic Medicine IoT in Healthcare Real-Time Health System Command Center	Digital Health Platform Genomics Medicine Precision Health Precision Medicine	Blockchain in Healthcare Digital Twins in Healthcare
High	Computer-Assisted Coding	Healthcare Application Marketplace Healthcare CRM Healthcare Interoperability Patient Portals (Untethered) Patient Self-Scheduling Population Health Management Solutions	AI-Enabled Diagnostic Imaging Interpretation Ambient Digital Scribe Critical Condition Surveillance Systems Digital Analytics Architecture Digital Clinical Voice Analysis Enterprise EHR Systems (Non-U.S.) Healthcare Consumer Persuasion Analytics Health Data Curation and Enrichment PTCM	
Moderate	Contact Tracing Apps	OpenNotes PHI Consent Management Real-Time Physician Documentation Improvement	Assistive Healthcare Robots	Automated Patient Decision Aids
Low				

Source: Gartner (July 2021)

Off the Hype Cycle

We have removed five innovation profiles this year to better focus this Hype Cycle on healthcare provider CIOs' most pressing demands:

- Healthcare ERP — This change reflects the advancing needs of healthcare ERP and its evolving toward a brighter but more complex future, the era of composable ERP. Therefore, ERP innovation profiles are now covered in our cross-industry ERP Hype Cycle.
- AI healthcare advisors — The role of AI in healthcare has matured, and new and more relevant technologies have been introduced that encompass the value and use case of AI healthcare advisors. Those profiles include AI-enabled diagnostic imaging interpretation, precision medicine, precision health and genomics medicine.
- Virtual Health Assistant (VHA) — The change reflects the broader scope of VHA and its value in relation to consumer engagement. Therefore, the VHA innovation profile is now moved to the Hype Cycle for Consumer Engagement With Healthcare and Wellness.
- Real-Time Healthcare Costing — Real-time healthcare costing has been removed from this Hype Cycle, as the technologies represented on the healthcare provider Hype Cycle directly support care delivery rather than associated or referential technologies.
- Eldercare-Assistive Robots — This profile is renamed to Assistive Healthcare Robots to include the broader value of assistive robots beyond eldercare.

On the Rise

Digital Clinical Voice Analysis

Analysis By: Sharon Hakkennes, Sachin Dev

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

Digital clinical voice analysis evaluates an individual's linguistic variables and vocal cues such as pitch, tone, pauses, word choices, speech rate and volume. These solutions are using artificial intelligence and machine learning to analyze voice patterns and codify voice biomarkers in order to noninvasively detect clinical abnormalities for clinical diagnosis and monitoring.

Why This Is Important

The characteristics of our voice and speech can be evaluated to screen for and monitor a growing list of clinical conditions. This includes behavioral health issues (including depression, psychosis, dementia and PTSD), Parkinson's disease, cardiovascular disease and lung disease, including COVID-19. Startup companies and researchers are leveraging technologies to find ways to detect abnormalities sooner and less invasively than traditional clinical assessments.

Business Impact

- Applications include predicting the onset, diagnosing and monitoring the progression of disease; measuring severity of symptoms; and monitoring response to treatment.
- Outcomes include supporting earlier detection of disease, more frequent monitoring and reducing reliance on highly specialized clinicians.
- Digital clinical voice analysis is noninvasive, affordable and can be completed in any location. Thus, solutions are highly scalable and ideally suited to support virtual care.

Drivers

This year, we have renamed this innovation profile from digital speech analysis for diagnosis to more accurately reflect the capabilities of solutions and breadth of clinical applications. Currently, clinical implementations of digital voice analysis remain largely restricted to research and small POCs at large academic medical centers. Key drivers impacting hype and adoption include:

- As a result of advances in technologies such as smartphones and home voice assistants, the enabling technology for accurate recording and real-time interpretation of the vocal data is now infinitely more available than ever before. That said, adoption remains limited at less than 1% of the target audience. The slow adoption of this technology is due, in part, to the limited availability of commercial solutions, with no FDA-approved solutions currently on the market.
- In the early stages of the pandemic, the hype around digital clinical voice analysis increased as vendors and researchers worked to identify voice biomarkers for COVID-19. Today, vendors such as Sonde and VocalisHealth have released commercially available solutions for COVID-19 screening. These solutions are enabling the identification of individuals at high risk of infection, supporting the triage process for testing and management.
- Over time, we predict that technologies to enable digital clinical voice analysis will become embedded as a core capability of healthcare chatbots and virtual health assistants. This evolution, combined with the continued extension and scaling of healthcare provider virtual care services, will be the catalyst for rapid scaling in adoption of this technology in the future.

Obstacles

Despite impressive early results and the obvious potential of these solutions, more proof of clinical effectiveness and clarity on regulatory approval are required. Key obstacles to widespread adoption include:

- The lack of large, characterized libraries of voice data from both well and disease-impacted individuals required for training and validating solutions. In particular, for integration into mainstream clinical practice, algorithms require validation on large diverse population datasets.
- Using software in place of physicians may result in lower payments, especially if clinician signoff becomes unnecessary.

- No solution will be 100% accurate; thus the clinical and legal ramifications of both false positive and false negative results must be accounted for. A false negative may result in a patient not seeking required medical care, and a false positive may result in unnecessary clinical testing and patient anxiety.

User Recommendations

Today, digital clinical voice analysis is a nascent technology; as such, healthcare provider CIOs should:

- Identify potential use cases by working with clinical leaders and CDOs, CNIOs and CMIOs to evaluate the current vendor landscape for alignment to clinical strategic priorities.
- Demonstrate both efficacy and practicality for identified use cases through small pilot projects in discrete clinical areas.
- Minimize risk associated with deployment of these solutions through early involvement of risk management to consider ethical, medical, legal and social issues — even in a pilot phase.

Sample Vendors

Canary Speech; Clarigent Health; Cordio Medical; Sonde; Telling.ai; Vocalis Health; Winterlight Labs

Gartner Recommended Reading

[Innovation Insight for Natural Language Processing for Healthcare Provider CIOs](#)

[Solution Path for Building an Effective Technical AI Strategy](#)

[Infographic: Artificial Intelligence Use Case Prism for the Healthcare Provider Industry](#)

Digital Health Platform

Analysis By: Mike Jones, Sharon Hakkennes

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

The digital health platform (DHP) is an architectural approach that enables healthcare providers to rapidly respond to external uncertainty and strategic change. This approach combines modern, cloud-first healthcare-specific applications and tools that encompass EHR data connectivity and powerful analytics with an ability to create application experiences tailored to specific, comprehensive use cases, workflows and user preferences.

Why This Is Important

The DHP directly addresses a major strategic issue for providers, where existing monolithic EHR-centric application architecture cannot meet changing patient, consumer and clinical workforce demands. The DHP architecture and emerging market solutions scale new digital capabilities and reduce digital friction through better end-user experiences. The DHP will reduce EHR total cost of ownership (TCO), liberate data for deeper insight, and deliver key clinical and cost outcomes.

Business Impact

- Increased resilience, adaptability and flexibility as organizational imperatives
- Increased value from current IT investments, and the ability to address capability gaps across the application portfolio (e.g., for care team collaboration and virtual care)
- Faster innovation and to help providers execute their digital roadmap by reducing reliance on low-value vendors
- Better business decisions through data and analytics, which improve insight at individual patient and population health levels

Drivers

- Pandemic disruption has required rapid innovation using new digital solutions. These include the need for on-demand virtual care, IoT for home-based patient monitoring, clinical collaboration tools and systems for remote, multiexperience patient engagement.
- Healthcare providers are now more open to innovative approaches from other industries to help recover and renew business and operating models. This has increased their appetite for modern platform architectures and enforcement of standards at national levels when forming digital health policies and procurement regulations.
- Organizations seek to transform the clinician experience to reduce the burden of IT and reduce burnout through automation and to optimize costs.
- The market for healthcare-specific solutions that support the DHP approach is accelerating.
- Adoption of industry standards, such as FHIR, among healthcare IT vendors is increasing as the need for application reuse, unmetered data access and improvements in interoperability is becoming an essential requirement for connected care.
- We have positioned this profile midway up the Innovation Trigger to reflect rapidly advancing maturity and expected market penetration by the leading DHP vendors such as Amazon, Google, Microsoft, Philips and Salesforce. These are companies that have industry experience, significant investment, and an existing mind and market share across regions. We expect the DHP to rise swiftly up and over the peak as drivers combine with the availability of regionally compliant, highly secure and available cloud SaaS and PaaS solutions.

Obstacles

- Regional legislation requires cloud vendors to adapt solution offerings for compliance, but may slow availability of solutions and require complex precontract evaluation
- The need to increase IT funding streams to support SaaS and PaaS pricing models in an industry that has historically used capital for new investment
- Low API maturity and delays by incumbent vendors to participate in open data ecosystems
- Limited range of packaged business capabilities offered by DHP providers or third-party vendors
- Lack of robust healthcare specific standards and tools to enable the design and operation of a real-time data fabric
- Shortage of architectural skills and capabilities of healthcare IT teams to apply this approach
- Mindset among CIOs and executive sponsorship that retains focus on an EHR-first model for new investment
- Commercial limitations that prevent CIOs from holding incumbent vendors to account

User Recommendations

- Change mindsets and adopt composable thinking by socializing the DHP approach with key stakeholders.
- Evaluate where poor digital experience is a priority and needs to change across existing business capabilities.
- Conduct a review of the current application portfolio to determine where gaps in capability exist, or if there is a negative burden on clinical workflow.
- Form fusion teams with SMEs from the highest-priority business units.
- Ensure common objectives are agreed upon and reflected in team goals.
- Evaluate DHP vendors on the basis of cost, capability and how their solutions fit with your existing licensing models for integration (e.g., in terms of open APIs) and across core I&O.
- Build DHP technical foundations by adopting an application strategy that is modular, composable and resilient.
- Apply the Gartner Composability Business Index to assess composability of current applications.

Sample Vendors

Amazon (AWS); Appian; Better; GE Healthcare; Google; InterSystems; Microsoft; Optum; Philips; Salesforce;

Gartner Recommended Reading

[Future of Applications: Delivering the Composable Enterprise](#)

[Innovation Insight for Packaged Business Capabilities and Their Role in the Future Composable Enterprise](#)

[Toolkit: Composable Business Index From the 2020 Gartner IT Symposium/Xpo Keynote](#)

[Tool: Healthcare Provider CIO Executive Presentation for a Composable Digital Health Initiative](#)

[Toolkit: Product Leaders' Guide to Meeting Healthcare Providers' Composable Business Needs](#)

[Establish Interoperable Application Ecosystems Early in Your Composable Healthcare Provider Roadmap](#)

[Creating the Composable Healthcare Organization for Healthcare and Life Science CIOs](#)

[Tool: Healthcare and Life Science CIOs Executive Presentation for Composable Data and Analytics](#)

Digital Twins in Healthcare

Analysis By: Gregg Pessin

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

A digital twin is a virtual representation of an entity such as an asset, person or process and is developed to support business objectives. An example in healthcare is the real-time health system (RTHS). The RTHS is at its core an organizational digital twin of the health system. This twin provides the situational awareness that enables the RTHS to deliver value, for example, through orchestrated clinical workflows and improved collaboration across care teams.

Why This Is Important

Digital twins are at the heart of situational awareness in healthcare delivery organizations. They are the culmination of information gathered from IoT and other sources to create an informed, accurate digital model of the real-world healthcare organization. Situational awareness is the engine behind various “hospital of the future,” “digital hospital” and “smart patient room” initiatives.

Business Impact

Digital twins positively impact these organizational areas:

- **Care delivery:** Clinical communication and collaboration; nurse call; alarms and notifications; crisis/emergency management

- **Patient engagement:** Experiential wayfinding; integrated patient room; interactive patient care; facilities and operations; patient throughput and capacity management; real-time operational dashboards; supply chain
- **Management and administration:** Real-time costing; healthcare information exchange; healthcare interoperability; revenue cycle management

Drivers

Digital twins have the potential to:

- Accelerate problem solving, decision making and enable more efficient and effective care delivery and administration operations.
- Ease testing of various scenarios that can lead to organizational improvement by studying the effects of changing various inputs and conditions under which the digital twin operates.
- Allow for change impact to be understood without disruption to services or the risk of impacting patient safety or quality.
- Create simulations that are both detailed and dynamic across the enterprise supporting many components of hospital operations and care delivery.
- Enable the process of getting the right information to the right people at the right time and place in order to enable highly informed decision making across the healthcare organization.
- Accelerate digital transformation by creating accurate real-time situational awareness for every aspect of the healthcare organization.

Obstacles

Challenges to digital twins are tied directly to their usability:

- The primary obstacle is poor data quality or low data point counts used to create the twins. Good decisions cannot be made based on twins that are built from unreliable data.
- Cultural obstacles exist based on reluctance to trust a digital twin representation of a real-world healthcare entity. There is a quality boundary or threshold that must be reached before that trust level can be achieved.

- Institutional barriers exist that can slow or prevent investment in these technologies based on misunderstanding of the potential value delivery offered by digital twins.

User Recommendations

To get started with a digital twin program, HDO CIOs should:

- Include a concise digital twin vision within the HDO's digital transformation strategy. With the direct correlation between digital transformation success and digital twins, the linkage must be established as part of the transformation's foundation.
- Educate business and clinical units to inform them about the benefits of digital twins and how they fit in with departmental and organizational goals. Start by identifying the right data to create highly effective digital twins and establishing a collaborative environment for the initiative among stakeholders.
- Create a pilot program by targeting simple models of patients, a department or other entity tied to a specific desired business or clinical outcome to understand digital twin challenges. Begin by analyzing the underlying source data required to compose the digital twins with the understanding that the usability of the twins is directly correlated to its data quality.

Sample Vendors

GE Healthcare; IBM Watson Healthcare; Philips; Siemens; ThingWorx; ThoughtWire

Gartner Recommended Reading

[Innovation Insight for Healthcare Provider Digital Twins](#)

[Healthcare Provider CIOs: Advance Clinical Operations Performance Through Situational Awareness Technologies](#)

[Use RTHS Principles to Guide Digital Transformation](#)

[What to Expect When You're Expecting Digital Twins](#)

[Use 4 Building Blocks for Successful Digital Twin Design](#)

Ambient Digital Scribe

Analysis By: Sharon Hakkennes

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

Ambient digital scribes are intelligent documentation support systems that leverage speech recognition, natural language processing (NLP), artificial intelligence (AI) and machine learning (ML) to automate documentation of the spoken aspects of a clinical encounter. These solutions use ambient listening and speech recognition technology to convert captured audio to text. Relevant information from the clinical encounter is extracted and summarized before being uploaded to the EHR.

Why This Is Important

The introduction of EHRs has increased the burden of documentation and is associated with negative impacts on work-life balance and clinician burnout. Physicians are spending double the amount of time at the computer than with patients. Ambient digital scribes replace clinicians and human scribes with technology by automating clinical documentation in the EHR. Many solutions also include virtual assistant technology, deploying voice user interfaces for EHR navigation.

Business Impact

Ambient digital scribes promise a number of benefits:

- Reducing time spent on clinical documentation and increasing the timeliness, completeness and accuracy of notes
- Addressing issues of clinician burnout associated with documentation and increasing the time available for clinicians to spend with patients, thereby improving engagement
- Supporting the move to value-based care models, which rely heavily on clinical documentation to identify gaps in care and inform shared savings payments

Drivers

There is a steady client interest in ambient digital scribes as HDOs explore potential use cases and value across their organizations. Availability and maturity of solutions are currently driving hype and adoption, including:

- Launch of Cerner's virtual scribe solution (September 2020): The solution was developed in partnership with Amazon Web Services. Through ambient listening of a clinical encounter, the virtual scribe captures the dialogue in text form, translating the concepts and delivering them as suggestions to the clinician for entry into the codified component of the Cerner EHR. The solution is currently in beta testing across a number of clients.
- Acquisition of Seattle-based startup Saykara by Nuance (February 2021): Saykara's voice-enabled assistant Kara is accessed via a mobile app to ambiently listen to conversations between physicians and patients to automate clinical documentation, including the generation of notes, orders and referrals.
- Integration of ambient digital scribe solutions into video-based platforms for virtual care: For example, there is the integration of the Nuance Dragon Ambient eXperience (DAX) solution into Microsoft Teams.

Obstacles

Currently available solutions rely on a quality check process that is performed by a human before the note is presented to the clinician for review and signoff. Commercial solutions are only available in the U.S., and we predict mainstream adoption will be closer to 10 years. This is due to a number of complexities, including:

- Availability and access to significant volumes of high-quality, context-specific, annotated data for training to increase the accuracy of solutions are limited.
- Underlying models must be trained by specialty, specific to language spoken and global variations in healthcare delivery models.
- Current solutions are limited to ambulatory settings, and it will be some years before they will be able to overcome the additional challenges, such as background noise, and complexities of the acute care environment.
- Ambient digital scribes capture the entire clinical encounter, raising privacy, ethical and legal concerns, which must be addressed prior to implementation.

User Recommendations

- Identify potential use cases for ambient digital scribes across your organization by actively engaging with the CMIO/CNIO and clinical leaders. Start with targeted specialty areas to run proofs of concept, using lessons from early trials to scale over time.
- Ensure deployment of ambient digital scribes delivers quantifiable benefits by developing an evaluation framework, including both operational and clinical measures. Align these KPIs with organizational, operational and strategic goals, including quality-of-care measures.
- Address privacy, ethical and legal concerns by enabling robust discussion and debate with legal, clinical and operational leaders. Develop policies and processes that deal with issues of consent, data ownership, retention and secondary use.
- Non-U.S. CIOs should prepare for the availability of ambient digital scribes by actively monitoring the market and evaluating outcomes of published case studies for alignment with local requirements.

Sample Vendors

3M; Cerner; DeepScribe; Nuance; Robin Healthcare; SoundLines

Gartner Recommended Reading

[Voice-Enable Your EHR to Improve Clinician Experience and Reduce Burnout](#)

[Innovation Insight for Natural Language Processing for Healthcare Provider CIOs](#)

[Best-Practice Framework for Realizing Healthcare Provider Value Across the EHR Life Cycle](#)

Precision Health

Analysis By: Sachin Dev

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Embryonic

Definition:

Precision health improves an individual's health by predicting the likelihood of future illness and recommending actions or interventions to promote health and disease prevention. It analyzes a wide range of data including clinical, genetics, lifestyle, behaviors, biometrics, genomics and social determinants of health. Precision health is built on technology advances in "omics" medicine and consumer data capture to identify individuals' optimal health pathway.

Why This Is Important

Early research has demonstrated precision health's potential for revolutionizing the health industry by identifying patient-specific health risks early on, leading to disease prevention. The strategic end goal of precision medicine is to create a healthcare system for well care, as opposed to sick care, by predicting early detection of illness or disease and preventing its progression using personalized treatment options.

Business Impact

Precision health breakthroughs will eventually disrupt the healthcare ecosystem and organizations' business models both operationally and technologically. The shift from curative to preventive care with the use of precision health interventions will become the new gold standard in medicine, aiming to cure illnesses before they happen through wellness and prevention efforts — and ultimately increasing lifespans, decreasing the incidence of lifestyle diseases and reducing chronic illness.

Drivers

- Advancement in precision health promises to shift the care delivery from curative to preventive by monitoring individuals' health, identifying risks, and performing wellness and preventive interventions — radically changing the primary and secondary care as we know it today. The implication is that the business model of today's healthcare organization, which relies on repair care episodes, needs to alleviate the skyrocketing care cost and revenue risk relying on ill patients.
- Precision health provides an opportunity to seize cost-effective and better health value upstream, prior to the patient's illness onset.
- With the advancements in machine learning (ML) and artificial intelligence (AI) capabilities, precision health can assemble and provide an aggregated view of patients' health, inclusive of all relevant clinical and demographic data points.
- The derived benefits of precision health with AI advancements include preventing sickness to allow for improved quality of life, increased productivity and reduced burden on the healthcare system.
- With an influx of new regulations on interoperability globally, healthcare organizations can integrate, analyze and act on multiple datasets. These will enable direct connections to physicians, care workers, genetic counselors, and other professionals and patients.

Obstacles

- Although evidence is mounting, it will take years to develop the technologies required to capture precision health data elements, standardize their recording and analysis and create evidence-based health pathways at scale. It will take even longer to develop AI-enabled insights from all the data required for each person.
- While advancement in interoperability will enable more collaborative approaches, current innovation networks are siloed with too much competition and not enough collaboration for precision medicine to succeed. It will also take time to create public policy and develop reimbursement models that link the value of preventive interventions to successfully eliminating a condition that may occur over 50 years in the future.
- Precision health may depend on patient behavioral changes that are difficult to achieve.
- Precision health will continue to rise on the Innovation Trigger slope, but we project it to be still at least five to 10 years away from the Plateau of Productivity.

User Recommendations

- Become collaboratively engaged in monitoring precision health technology developments. Track the leading indicators of adoption for precision medicine. These include decreases in the cost of sequencing and companion testing; reductions in the cost of treatment; and increasing rates of reimbursement for treatment.
- Find opportunities to leverage developing organizational competence in responding to genomic and biomarker analysis and consumer engagement to amass the data and analytics capabilities required for precision health initiatives.
- Keep precision health concepts on your growth strategy and roadmap, as they establish population health management and invest in precision medicine platforms. Take the long view in capturing more data than less, positioning the organization for its use in research or AI-driven initiatives to see precision health business opportunities.

Sample Vendors

2bPrecise; DNAnexus; Molecular You; Orion Health; Precision Digital Health

Gartner Recommended Reading

[Targeting AI in Healthcare Delivery Organizations](#)

[Infographic: Artificial Intelligence Use-Case Prism for the Healthcare Provider Industry](#)

[Innovation Insight for Consumer Experiences in Healthcare and Life Sciences](#)

Automated Patient Decision Aids

Analysis By: Veronica Walk

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Embryonic

Definition:

Automated patient decision aids (APDAs) are software-based, complex interactive systems that use computational logic and AI to help patients make better-informed health decisions aligned with their personal values and preferences. ADPAs provide the patient with access to evidence-based insight, probabilities and scenario analyses personalized to their unique needs. These aids may include triage, diagnostic and treatment options, end-of-life choices, and first-pass genetic counseling.

Why This Is Important

The precursor to APDAs are patient decision aids (PDAs) that inform patients about alternative treatments along with their benefits, risks and costs. However, PDAs lack automation and require considerable guidance from clinicians to support individual decision making. The advanced capabilities of APDAs empower patients to understand their personalized options and guide patients more independently through the decision-making process.

Business Impact

Healthcare payers and providers can use ADPAs to improve patient:

- Engagement through increased knowledge about their condition, choices and accuracy of their risk perceptions.

- Interactions with clinicians by narrowing complex decisions to the critical issues and facilitating shared decision making.
- Satisfaction and loyalty by taking into consideration patients' values and preferences in the context of their healthcare decisions.

Drivers

- Shared decision-making (SDM) in healthcare has been shown to improve patient satisfaction and outcomes and remains a key objective of patient-centered care initiatives.
- The COVID-19 pandemic has increased patient and provider openness to the concept of ADPAs for primary care and triage. For example, many organizations implemented self-triage solutions as part of their patient portal or website to help patients determine whether they needed to be tested for COVID-19, self-quarantine or seek medical treatment.
- Although decision aids have broad benefits for engaging and empowering patients, we continue to see slow progress along the Hype Cycle for APDAs.

Obstacles

- Traditional PDAs are not widely adopted to facilitate SDM, and ADPAs remain more of a research interest rather than commercial interest.
- The use of robust AI-driven APDA integrated within a clinical pathway is still experimental and triggers concerns over the ethical use of artificial intelligence (AI) in clinical decision support (CDS) and SDM.
- Barriers to adoption include relatively immature products, healthcare providers' competing priorities, payment issues and legal concerns.
- Lack of integration with other clinical workflows and solutions, such as the enterprise electronic health record (EHR), consumer engagement, and care management systems also impeded adoption.
- Patient barriers include a lack of trust in automated systems, lack of personalization and perceptions about quality.

User Recommendations

If you are CIO of a digitally progressive organization with mature patient engagement strategies:

- Pilot ADPAs by engaging with clinical colleagues to identify the right use cases and explore adoption challenges.
- Encourage adoption in your organization by coaching clinicians on how to use ADPAs and how to communicate with patients during discussions of their informed preferences.
- Minimize digital friction by incorporating ADPAs into your overall patient engagement strategies and platforms, such as your digital front door or patient portal.
- Increase clinician engagement and support for these solutions by integrating within clinical workflows, such as the EHR.

Sample Vendors

EBSCO; Health Dialog; Healthwise; Optum; Wolters Kluwer

Gartner Recommended Reading

[Create Connected Care Pathways That Bridge Consumer and Healthcare Provider Activities](#)

[Healthcare Provider CIOs: Bridge the Virtual Care Divide Between Provider- and Consumer-Directed Care](#)

Precision Medicine

Analysis By: Sachin Dev, Mike Jones

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Precision medicine improves health outcomes by precisely diagnosing and treating a disease condition or its prevention. It leverages individual factors of the disease, such as physiology and genomic indicators, and patient factors, such as social determinants of health and lifestyle. Precision medicine technology orients this data in context for clinical diagnosis and treatment protocols — thus integrating EHR, PHM, genomics, labs, images, treatment protocols and other digital data sources.

Why This Is Important

Precision medicine has the potential to transform medicine and significantly improve health outcomes.

As the underlying technologies mature, precision medicine will become prevalent — even pervasive — in clinical practice and complex disease treatment (for example, creating a targeted treatment plan in cancer patients). To remain competitive, HDOs must adopt these technologies to bring precision insights to clinical diagnosis and treatment, and bridge clinical decisions into care delivery.

Business Impact

Precision medicine has the potential to transform clinical medical decision making and to enable mass personalization of consumer healthcare engagement. It will likely drive the majority of healthcare delivery and targeted clinical decision support by 2026. HDOs are reporting its yield in terms of significantly reducing incidences of medical diagnosis error, better patient outcomes, reduction in treatment variability and ultimately leading to reduction in total cost of care.

Drivers

- Technology and research advancements as well as product innovations are sustaining the growth of precision medicine adoption.
- Many new treatments designed to target a specific change are used globally, and more use cases are being tested right now in precision medicine clinical trials.
- Advancements in genomics plus the inclusion of genomic data with clinical data helped curate an expanded knowledge base. This helped gain the clinical community's confidence, ultimately leading to more commercialization of precision medicine technology in the last two years.
- The field is gaining new insights into disease origins, which drugs work in which patients, which therapies are effective given an individual patient's profile and how various diseases respond to efforts to combat them.
- Precision medicine technologies provide a manageable context to align the scientific, genomic and phenotypic data, and other data about the disease and patient to enable precision medicine at scale. This enables the systemic use of information in care delivery processes, integrated with EHR and other tools within the care delivery workflow, and enables the primary benefits of precision medicine.
- Gartner is observing transitions from custom approaches to more scalable platform-based approaches, integration of data and analytics, and diagnosis and treatment decisions driving the demand from HDOs.

For these reasons, we cautiously advance precision medicine closer to the peak on the Hype Cycle, and also adjust our forecast of time to mainstream adoption from more than 10 years to five to 10 years.

Obstacles

- Precision medicine at scale is unevenly accelerating. Oncology is an early adopter, while other areas of medicine are closely following the development of additional approved diagnostic and therapeutic use cases in their respective field.
- Regulatory requirements and government agency approvals slow approval and adoption in heavily regulated markets. However, there are a number of use cases of precision medicine globally, especially in self-regulated or unregulated nations.
- While we observed some great advancement this year, ongoing challenges continue with the speed of new scientific discoveries beyond oncology. These challenges include technology adoption, cost and reimbursement of genomic sequencing, EHR integration, and managing the volume of data required to truly deliver precision medicine.

User Recommendations

- Assess the preparedness of your organizational clinical data collection and analysis strategy. Precision medicine relies on effective, efficient and actionable patient data collection and the analysis and assessment of that data to arrive at a precise diagnosis and treatment.
- Adopt a forward-looking healthcare analytics architecture. CIOs must lead the move toward the enterprise architecture, workflow and decision support design, and new partnerships that enable precision medicine analysis.
- Prepare IT architecture to accept a diverse array of patient information sourced from genomics, mobile apps and devices, wearables, patient-reported data, social determinants of health, and other sources. Similarly, CIOs should engage a data broker or medical hub partner for patient data collection and assess vendors that provide precision platforms built on open technology and aid cognitive support at the point of care.

Sample Vendors

2bPrecise; BC Platforms (GeneVision); IBM (Watson); Orion Health; Philips; Syapse; Tempus

Gartner Recommended Reading

[Healthcare and Life Science CIO's Genomics Series: Part 1 — Understanding the Business Value of Omics Data](#)

At the Peak

AI-Enabled Diagnostic Imaging Interpretation

Analysis By: Pooja Singh, Sachin Dev

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Definition:

AI-enabled diagnostic imaging interpretation uses deep learning techniques, machine learning (ML) and categorization technology on large sets of medical images in order to create workflows and algorithms that allow for faster and more accurate image interpretation. AI-enabled interpretation can be applied to many radiological procedures, such as X-ray studies, magnetic resonance imaging (MRI) exams and computed tomography (CT) scans.

Why This Is Important

Radiology images are a significant component of a patient's health information. As the number of images that require analysis and reporting per patient is growing, global concerns around shortages of radiologists, radiologist burnout and chances of misdiagnosis are rising. AI-enabled solutions can augment radiologists, prescreening large numbers of images, helping clinicians prioritize their workloads and redirecting their attention to the images that are most urgent.

Business Impact

- AI-enabled diagnostic image interpretation helps reduce the read time by highlighting and drawing readers' attention to the abnormality in the image. This assistance helps reduce radiologist burnout.
- Reduces the likelihood of a missed diagnosis, as the AI algorithms flag abnormalities that may be missed by the reader's eye at times.
- For high-risk patients, it helps automatically prioritize the scans in the radiologist's worklist, which allows faster diagnosis, treatment delivery and intervention.

Drivers

- Regulatory bodies worldwide now approve solutions that can augment clinicians' decision making when reading diagnostic images. Recent success with lung imaging analysis during the COVID-19 pandemic along with multiple vendor approvals granted by FDA to use AI-enabled imaging analysis is further accelerating adoption.
- The number of use cases and applicable modalities are increasing. While CT and MRI have been the primary modalities, use cases are emerging in other areas such as mammography (including 3D tomosynthesis), fundus imaging (of the eye), ultrasound and echocardiography.
- Recently, in the U.S., the Centers for Medicare and Medical Services (CMS) has granted New Technology Add-On Payment (NTAP) to various vendor solutions offering AI/ML solutions for diagnostic image interpretation. As a result, healthcare providers who are using AI/ML solutions from approved vendors for diagnostic image interpretation can receive CMS payments (see [CMS' New Technology Add-On Payment Ruling](#)). This move by CMS encourages healthcare providers to adopt the technology.
- Major picture archiving and communications system (PACS) vendors have started introducing AI-algorithm marketplaces which offer a range of AI-algorithms designed for specific clinical use cases (such as cardiology, bone health and oncology). This approach leads to a simplified integration process with native PACS systems, and often helps reduce the total cost of ownership to the healthcare provider.
- Based on the increased interest and recent developments, we are positioning this profile at the Peak of Inflated Expectations, with time to mainstream adoption between five and ten years.

Obstacles

- AI-enabled diagnostic imaging interpretation has matured from nascent to emergent in the past 18 months, However, regulations, lack of clarity on likely ROI and cultural acceptance (by radiologists, clinicians) can stifle the chances of mainstream adoption.
- Based on Gartner client interactions, there is a degree of skepticism among some healthcare providers – primarily apprehension regarding the disruption to existing reporting workflows which many radiologists view as already being efficient.

- Healthcare providers often have concerns around whether the test data that will be used to train algorithms is representative of a wide population and applicable to their specific patient population.
- A lack of product standardization and benchmarking complicates the solution procurement process (see [FDA Challenges for Approving AI](#)). Many vendors are still in the early stages of product development.

User Recommendations

- Update their position on using AI for diagnostic image interpretation by developing an assessment framework to evaluate the benefits, risks and understand regional regulatory requirements prior to making a business case.
- Work with clinical leaders in the imaging specialties and risk management to carefully evaluate and determine the speed and priority of adoption. Healthcare providers already experiencing shortages of imaging specialists or long lag times between study completion and final interpretation should consider piloting sooner rather than later.
- Address cultural acceptance issues by both patients and clinicians and concerns about the efficacy of these solutions and transparency of the algorithms.
- Prioritize solutions offering integration with your existing medical imaging workflow with minimal disruption, their ability performance at scale, and their compliance and regulatory approval status.

Sample Vendors

Aidoc; Arterys; DiA Imaging Analysis; GE Healthcare; MaxQ AI; Philips; Qure.ai; RapidAI; Siemens Healthineers; Zebra Medical Vision

Gartner Recommended Reading

[Innovation Insight for AI-Enabled Diagnostic Imaging Interpretation for Healthcare Provider CIOs](#)

[Healthcare Provider CIOs: Get Ahead of AI Innovation With Strong AI Governance](#)

[Moving AI to Production — Presentation on Healthcare Providers' Perspectives](#)

[Emerging Technologies and Trends Impact Radar: Artificial Intelligence in U.S. Healthcare Delivery](#)

Survey Analysis: Healthcare Providers – Measure Your Readiness for the Expanding Role of AI

Health Data Curation and Enrichment

Analysis By: Jeff Cribbs

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Healthcare data curation and enrichment represents the processes and technologies that add value to data gathered from across the consumer/citizen/patient health and wellness continuum. These technologies and processes then apply cleansing, normalization and other enrichment services (such as episode grouping, predictive model scoring or outcome labeling) to maximize value in downstream consumption and use and facilitate agile data governance.

Why This Is Important

At a time when data sources in healthcare are expanding rapidly and advanced analytic techniques (like AI) are entering mainstream use, many healthcare organizations struggle with the basics of data quality and governance. Data curation and enrichment tools are becoming critical components of the digital architecture, to derive value from new data sources, improve and automate data quality, and enable more sophisticated and pervasive use of data.

Business Impact

Successful deployment of a comprehensive health data curation and enrichment capability is a foundational component of the real-time health system, conducting digital healthcare, and the ability to execute population health and community-based care. The future success of both payer and provider organizations in achieving their digital health ambitions is dependent on optimizing the use and liquidity of the data it amasses.

Drivers

- New regulatory requirements from national eHealth initiatives and local government initiatives to share data more effectively in serving a common set of citizens across the traditional boundaries of health and social care.
- The scarcity of talent, especially in data engineering and data science, has driven a search for more automated ways for analytic-ready datasets.
- The integration of analytics technology and operational technology architecture has created the requirement for an integrated approach to curation and enrichment for these traditionally separated processes.
- We have advanced this profile forward, from the trigger to closer to the peak, in line with this growing need. However, we anticipate some rationalization between the data and enrichment processes and technologies covered here, and the rapidly evolving “data fabric” architecture, which may result in repositioning and rescoping of these profiles in the next 12 months.

Obstacles

- Many data enrichment and curation hub technology and service providers either offer a broad platform across the data enterprise life cycle, or offer capabilities narrowly targeted on a particular data source, enrichment type or functional domain (like care quality improvement). Stitching these moving pieces into a coherent architecture for the enterprise can be complicated and resource intensive.
- Problems with data curation and enrichment are often several layers of technology behind the problem a clinical or business user is actually experiencing. Making the case for additional investment in the core capability can be challenging for healthcare technology leaders.

User Recommendations

- Proactively assess what the data integration demands across the healthcare organization will be over the next three to five years. Cull insight from the organization's strategic plan and through other deliberate short-term and midterm visioning exercises. Determine if today's data integration strategies will be sufficient in three years.
- Create requirements by mapping out the patient, provider and administrative journeys, and document the ideal movement of data across the enterprise. Update the enterprise and information architectures to reflect the future state. Develop your five-year roadmap.
- Prepare the business for the likelihood of a multivendor, build-and-buy, insource-and-outsource solution for enterprise data curation and enrichment needs. This is particularly true in organizations where business leadership may expect an incumbent megavendor or a new partnership with a digital giant to address all requirements. This is unlikely in the near-term and midterm.

Sample Vendors

Alteryx; CareEvolution; DataMotion; DXC Technology; Health Catalyst; IMAT Solutions; Informatica; Innovaccer; Verinovum

Gartner Recommended Reading

[Drive a New Data and Analytics Architecture to Match Your Digital Healthcare Provider Needs](#)

[Emerging Technologies: Data Fabric Is the Future of Data Management](#)

Healthcare Application Marketplace

Analysis By: Mike Jones, Sharon Hakkennes

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

An application marketplace is an online digital platform that facilitates the composition, hosting, distribution and consumption of packaged digital products and services to healthcare providers. Application marketplaces can operate at an organization level — to support internal sharing of prebuilt applications and algorithms — or be deployed across an ecosystem (e.g., by EHR or PACS vendors to their customers), operating as a distribution channel for third-party developers.

Why This Is Important

Healthcare application marketplaces deliver low implementation effort solutions to healthcare providers that can address both significant gaps in EHR or PACS vendor functionality and offer new products that would not typically be found in an EHR. Products, in the form of apps and algorithms, are targeted to specific business needs. Marketplaces help CIOs quickly scale new capabilities to a range of end users without the need to develop that capability in the underlying clinical system of record.

Business Impact

- Application marketplaces support patients and care teams with a range of modern digitally enabled business and clinical activities, such as patient engagement apps (e.g., a patient portal on a smartphone), digital therapeutics (e.g., hypertension or diabetes management) and clinical algorithms (e.g., a COVID-19 symptom checker).
- Application marketplaces require dedicated information governance, privacy and security protocols as marketplace solutions will need to access and integrate with core systems.

Drivers

- The explosion of consumer-facing medical grade devices (e.g., fitness trackers that incorporate an ECG) into the market in recent years has increased the demand for apps to manage those devices and securely capture associated data.
- There is an increased need for easy access to functionality that addresses the gaps that exist in core clinical systems such as consumer and patient engagement, access to patient held records, and virtual care.
- EHR and PACS vendors are offering proprietary application marketplaces for their core products as part of their business model for generating revenue through API licensing and revenue shares of any app sold on their marketplace (e.g., [Epic's App Orchard](#)).
- Open source developer communities are also developing their application marketplaces. For example, the Substitutable Medical Applications and Reusable Technologies (SMART) App Gallery from Smart Health IT is an open-standards-based platform. It is built from systems that, together, allow for access authorization and application execution of independent code that can access HDO-based FHIR resources, typically EHR-controlled medical records. The apps are compatible with any EHR vendor's environment from a single codebase.
- As a result, the number and availability of marketplace apps and algorithms will increase, driving up care quality and reducing costs.
- Increasingly, health systems are looking to shift elements of their care model outside the facility and into patient homes or provider care remotely. Application marketplaces are a way for health systems to publish their solutions or easily signpost and subscribe patients to recommended apps.
- As this is one area of digital healthcare that will accelerate with the shift toward virtual care and that thrives in the digital health platform era, we project the time to maturity for the healthcare application marketplace to become mainstream within two to five years.

Obstacles

- Application vendor onboarding requires dedicated experts in API security and information governance, which not all healthcare providers have. API security requires dedicated tools to ensure risks are mitigated and monitored to prevent data or security breaches.
- Managing the application marketplace is usually the domain of the core system of record vendors (e.g., an EHR vendor or a PACS vendor). As healthcare providers seek to bring an app into the marketplace, they may need to meet the commercial requirements of the marketplace, which often creates additional licensing costs.
- Patient privacy requirements can be onerous and require third-party application vendors to meet certain standards, which can increase development costs and time to value.
- For some EHR vendors, application marketplaces pose a threat to their business model of providing all functionality in the core product. This can lead to information blocking practices when trying to establish workable APIs or commercial terms.

User Recommendations

CIOs working with CNIOs and CMIOs seeking to expand patient facing and clinical functionality beyond the core EHR should:

- Raise enterprise awareness of the potential to use a healthcare application marketplace and explain the advantages that the application marketplace offers vs. in-house development.
- Develop an app strategy that sets out how you will evaluate and benefit from the deployment of apps by assessing capability gaps across your organization (e.g., mobile capture of patient vital signs and calculation of early warning scores).
- Determine how your EHR or PACS vendor currently supports the integration of third-party apps or seeks to monetize new application integration.
- Extend your application and information governance policies to ensure apps and algorithms acquired through application marketplaces meet clinical, infrastructure, support, privacy and security requirements and standards.

Sample Vendors

Allscripts; Apervita; athenahealth; Cerner; Epic; Microsoft; Orion Health; Salesforce; SMART Health IT; VigiLanz

Gartner Recommended Reading

[Unleash the Innovative Potential of EHR App Extensions to Advance Healthcare Delivery](#)

[Governance and Change Management for a Pace-Layered Application Strategy](#)

[Emerging Technologies: Adoption Growth Insights for API Security](#)

[Top 10 Things CIOs Need to Know About APIs and the API Economy](#)

Algorithmic Medicine

Analysis By: Veronica Walk, Sachin Dev

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Algorithmic medicine enables advanced clinical decision support using insights and rules built from clinical guidelines, evidence-based best practices and other clinical data repositories to accurately draw “expert level” diagnosis and treatment decisions. These solutions rely on artificial intelligence, machine learning, natural language processing and rule-based algorithms to augment clinical judgment by suggesting diagnoses and specific treatment protocols.

Why This Is Important

Algorithmic medicine has the potential to radically change care delivery. These solutions can supplant certain clinical activities up to and including diagnosis and treatment, enabling increased diagnostic accuracy and earlier interventions and freeing clinicians to focus on clinical situations that require human interaction. There is already ample evidence of machine learning predictive models outperforming clinicians.

Business Impact

Algorithmic medicine can augment clinical decision making and speed time to diagnosis and treatment, improving outcomes and reducing the cost of unnecessary testing. It is increasingly accepted and used to address high-priority clinical conditions and outcomes, such as hospital readmissions, sepsis and most recently, COVID-19. Growing evidence exists for use cases such as cancer detection, diagnostic image interpretation and speech analysis for disease detection.

Drivers

The pandemic has accelerated the acceptance and development of advanced algorithmic medicine solutions that previously have been stymied by cultural, ethical and medicolegal challenges.

- Healthcare providers struggled to keep pace with rapidly evolving COVID-19 diagnosis, treatment and infection-control guidelines. Due to surging patient volumes, many organizations were forced to augment their hospital workforce with nontraditional or external providers unfamiliar with the acute care setting. These circumstances exacerbated the need for and accelerated the development and adoption of algorithmic medicine.
- Likewise, many organizations faced shortages of hospital and ICU beds, medications, personal protective equipment, testing, ventilators and other resources, provoking a demand for algorithms to allocate limited resources and standardize clinical decision making.
- As with other healthcare technologies, algorithmic medicine benefited from the relaxation of regulatory barriers, enabling rapid deployment and real-world proof of concept. However, as regions return to some semblance of normal, these regulations are likely to tighten but not without lessons learned from the solutions developed and implemented in response to the pandemic.
- In light of increased interest and usability of algorithmic medicine during the COVID-19 pandemic, and with a growing number of FDA-approved algorithms in medicine, we move this profile further to the Peak of Inflated Expectations. We expect algorithmic medicine to reach mainstream adoption in less than five years.

Obstacles

Despite progress due to pandemic conditions, numerous barriers remain that need to be addressed:

- Regulatory issues, payment concerns, medicolegal issues (for example, who will be held responsible when an algorithm is “wrong” or when it will be considered malpractice to not use an algorithm).
- Algorithmic bias due to incomplete or inherently biased datasets or models. These biases became evident in some deployments of algorithmic medicine during the pandemic and are highly concerning for their potential to exacerbate existing socioeconomic health disparities.
- The most advanced algorithms are often the least explainable — often referred to as “black box algorithms” — leading to doubt and distrust among patients and providers.

User Recommendations

CIOs and informatics leaders such as the chief medical informatics officer or chief nursing informatics officer should:

- Maximize investments in algorithmic medicine by partnering with clinical and business leaders to identify high-priority use cases and drive adoption. Leverage shared risk agreements with vendors to ensure the solution delivers on the value proposition.
- Establish strong governance to vet and oversee algorithmic medicine by engaging with leaders throughout the organization, including clinical leadership, compliance, data sciences, legal and risk management. Carefully monitor for algorithmic bias and unintended consequences. Work with risk management and legal to understand and eventually mitigate any ramifications of either using, or failing to use, algorithmic medicine.
- Earn clinicians’ and patients’ trust by starting with more explainable algorithms. Commit to transparency in reporting outcomes and addressing any signs of bias or unintended consequences.

Sample Vendors

AgileMD; Cerner; Dascena; Epic; Jvion; VigiLanz

Gartner Recommended Reading

[Reframe and Reignite Clinical Decision Support in Response to COVID-19](#)

[Reset and Accelerate Your Digital Care Delivery Agenda With Clinical Informatics Partners](#)

[Healthcare Provider CIOs: Get Ahead of AI Innovation With Strong AI Governance](#)

Blockchain in Healthcare

Analysis By: Gregg Pessin

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Adolescent

Definition:

A blockchain is an expanding list of cryptographically signed, irrevocable transactional records shared by all participants in a network (e.g., consumers, providers and payers). Each record contains a time stamp and links to previous transactions. With this information, anyone with access rights can trace back a transactional event, at any point in its history, belonging to any participant. A blockchain is one architectural design of the broader concept of distributed ledgers.

Why This Is Important

Blockchain's core features and capabilities make it an important technology for healthcare, as blockchain:

- Enables parties that don't trust each other to work together.
- Democratizes control because anyone can be a participant on the blockchain.
- Embraces a peer-to-peer decentralized design that fosters security and prevents bottlenecks and system dependencies created by a main centralized authority.
- Prevents censorship and invasion of privacy, which is always possible with centralized controls.

Business Impact

Blockchain and distributed ledger concepts hold the promise of transforming both architectures and operating models. The potential of this technology to radically transform economic interactions could impact the health value chain, regulators, suppliers and consumers. The potential is the focus of several research efforts including MIT's MedRec2.0 and Estonia's national consumer-controlled electronic medical record (EMR).

Drivers

- Blockchain potentially enables efficiencies for reaching new customers, extending relationships with supply chain partners, and offering better quality and more complete linkages between events and data.
- Blockchain has the potential to expand the boundaries of healthcare by connecting industry systems of record directly to end users without the burden of centralized control.
- Leading enterprises are starting to realize that blockchain can address multiple problems that other technologies cannot, such as auditability; oversight and management of public fund distribution; delivery and use of healthcare incentives to change public action; and decentralized identity management for contact tracing.
- Today, breakthroughs are few, with enterprise pilots concentrated on blockchain-inspired or distributed ledger technology (DLT) solutions.
- Market adoption has slowed over the year, as the industry continues to explore how blockchain can support business process efficiency improvements.
- The focus on credentialing, document management and supply chain is being pursued by a few enterprise initiatives, or through consortia such as the Synaptic Health Alliance and Hashed Health.
- It seems clear from client conversations that value extraction is problematic.
- Regardless of the technical challenges that need to be overcome, many CIOs are realizing that standard distributed database-style projects are doing little to sufficiently boost returns.

- Moreover, there is a sticking point when it comes to scaling private architectures. It is noticeable that some vendors have diluted their blockchain-labeled DLT messaging and are concentrating more on value delivery including digital transformation, Internet of Things (IoT) and artificial intelligence (AI).

Obstacles

- The immaturity of the technologies underlying blockchain prevents adequate levels of scale, security and usability with enterprise levels of performance and security.
- The transformative nature of blockchain at a process, operating and business model level (in terms of decentralization and tokenization) implies the need to break and remold decades-old healthcare industry processes, relationships, systems and structures.
- Regardless of the technical challenges that need to be overcome, many CIOs are realizing that standard distributed database-style projects are doing little to sufficiently boost returns.
- Scaling private architectures is proving difficult and expensive.

User Recommendations

- Track blockchain's market readiness in healthcare and factor these trajectories into your strategic plans and investment timing. The most transformative and impactful applications will be oriented to ecosystem services with multiple organizations involved, and they will take longer to evolve.
- Differentiate the kinds of blockchain technology providers and disruptors by establishing a map of solution providers in your industry sector.
- Use Gartner's criteria for identifying opportunities and apply the decision framework to determine the blockchain technology approach.
- Experiment with innovative trials using blockchain, but also be ready for setbacks as use cases emerge and the technology itself continues to evolve.

Gartner Recommended Reading

[What Healthcare and Life Science CIOs Need to Know About Blockchain](#)

[Four Compelling Blockchain Initiative Types for Healthcare and Life Science](#)

Understanding the Gartner Blockchain Spectrum and the Evolution of Technology Solutions

Critical Condition Surveillance Systems

Analysis By: Veronica Walk, Pooja Singh

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Critical condition surveillance systems monitor clinical data from the electronic health record (EHR) and point-of-care medical devices in near real time. Using evidence-based algorithms, these systems detect signs of clinical decompensation that could be life-threatening or warrant urgent transfer to a higher level of care and then trigger alerts to appropriate members of the care team.

Why This Is Important

Historically, healthcare providers in the acute care setting have relied on early warning scores to monitor for signs of clinical deterioration using manual or partially automated calculations. Critical condition surveillance systems have drastically improved on these methods by using real-time clinical data to continuously monitor and predict deterioration across a broader patient population. Pandemic conditions have only increased the value proposition and adoption of these solutions.

Business Impact

Healthcare delivery organizations (HDOs) providing higher acuity care can use these solutions to:

- Enable earlier intervention on deteriorating patients, which can improve their chance of survival and reduce the need for emergency treatments and higher-cost care.
- Automatically notify caregivers to potential clinical decompensation, thereby reducing the burden on resource-constrained care teams.
- Stay current with the latest evidence-based algorithms for critical condition surveillance.

Drivers

- We expect patient monitoring vendors and stand-alone solutions that specialize in critical condition surveillance to outpace the megasuite EHR vendors' limited, condition-specific offerings such as sepsis surveillance. For example, vendors such as Philips are investing and expanding their portfolio in this space with their acquisition of medical-device integration vendor Capsule Technologies.
- With their resources focused on keeping up with clinical evidence and improving their algorithms through artificial intelligence (AI) and machine learning (ML), stand-alone solutions are likely to become better predictors of clinical deterioration and expand to additional use cases.
- Widespread acceptance of these systems will require greater specificity and sensitivity to reduce false positives. Cloud-based ML on large and complex datasets, with diverse and often disparate clinical and nonclinical data sources, is starting to show superior predictive ability.
- The pandemic only added pressure on hospitals to manage increasingly complex and critically-ill patients. Given a shrinking highly skilled workforce and compelling evidence of improved outcomes, we anticipate accelerated adoption of these solutions. Mainstream use will be between five and 10 years.

Obstacles

- Critical condition surveillance requires robust and potentially costly medical device integration to continuously monitor patients using a comprehensive set of clinical data points.
- As an evidence-based platform, most stand-alone systems are also quite expensive due to the required research to develop, validate and maintain the clinical algorithms driving these solutions.
- Due to high cost and lower value proposition for smaller organizations, adoption is currently limited to larger organizations with the budget and resources to justify the investment in these solutions.
- Solutions with imprecise algorithms or alerting will only add noise to the already burdensome clinical workflow and fail to improve outcomes.
- Solutions that rely on unexplainable "black-box" algorithms will face greater provider and patient scrutiny.

User Recommendations

Healthcare provider CIOs should partner with clinical informatics colleagues to:

- Establish the need for critical condition surveillance solutions by evaluating sepsis, mortality and patient safety data. Compare what can be accomplished within the EHR and identify gaps that might be addressed by a specialist vendor.
- Judiciously vet any potential solution by examining the evidence base and update frequency for the clinical algorithms. Address clinician and patient mistrust by giving priority to vendors using explainable and well-validated AI.
- Enable your organization to take advantage of these solutions by prioritizing medical device integration and EHR interoperability.
- Minimize alert fatigue by tracking false-positive alert rates and evaluate a vendor's ability and willingness to improve their solution accordingly.

Sample Vendors

AgileMD; Hillrom; Jvion; Medical Informatics; PeraHealth; Philips

Gartner Recommended Reading

[CIOs Need to Expand Their Perspective on Clinical Data and Analytics Change Efforts or Plan to Fail](#)

[2021 Strategic Roadmap for the Real-Time Health System](#)

[Reset and Accelerate Your Digital Care Delivery Agenda With Clinical Informatics Partners](#)

[Reframe and Reignite Clinical Decision Support in Response to COVID-19](#)

IoT in Healthcare

Analysis By: Gregg Pessin

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

IoT in healthcare is a collection of devices, applications, equipment, appliances and buildings that possess the ability to connect, communicate and interoperate with each other using standards within an ecosystem of smart things. IoT in healthcare is foundational to the real-time health system.

Why This Is Important

IoT in healthcare is foundational to digital business and, as such, will transform care delivery as it evolves and matures. IoT will positively impact healthcare providers' ability to deliver care more efficiently and cost-effectively. Connected things will drive revenue and improve operational efficiency and asset utilization.

Business Impact

- Improved operations, productivity, efficiency, logistics and coordination.
- Optimized asset utilization, reliability, predictive maintenance and performance management.
- Enhanced remote monitoring through virtual care, leading to reduced need for hospitalization.
- Increased engagement with caregivers for patients, care providers and others.
- Improved wellness, longevity and care delivery for a better quality of life.
- Enhanced security for physical assets, as well as safety of patients to reduce risk.

Drivers

As HDOs mature into real-time health systems, IoT populations enable the pervasive situational awareness required. This level of IoT-based situational awareness supports base industry drivers:

- The need to transition clinical operations to population health and value-based models.
- Requirements to transform the orientation of operations around the patient.
- The demand to create a community of partnerships and networks to increase operational efficiencies across the ecosystem.

- The need to improve operational bottlenecks and the patient journey, addressable through the implementation of real-time, situational awareness technologies.
- The need to reduce clinical and administrative costs.
- Fiscal pressure to capture revenue opportunities and create new business.

Obstacles

- Lack of security and privacy measures built into IoT devices creates additional workload for IT departments.
- IoT populations, in general, do not have the ability to be centrally governed through device policies as other IT devices can, such as endpoint computers and mobile devices.
- IoT selection oversight during the acquisition process for clinical devices is not an IT function. This leaves critical decisions that impact IT to functional departments that may not have the ability to assess security, privacy and IT operational impacts.

User Recommendations

IoT in healthcare impacts a variety of clinical and business processes and, as such, will affect a range of stakeholders. Use the following points to guide your actions:

- Start small, experiment and look to other industries and ecosystem partners for ideas.
- Build business cases with ROI extending across core business processes.
- Engage your customers in the solution development. Use prototypes to help explore opportunities.
- Ensure the architecture teams are ready to incorporate IoT across IT and OT technology stacks.
- Increase your capabilities to leverage big data cost-effectively.
- Plan to invest in skills and technology to support healthcare-specific IoT platforms and IoT software integration, and data and analytics, as well as managed security solutions.
- Select your technology and service provider partners based on their technology stack and their partner network.

- Ensure there is end-to-end compliance of your IoT solution with local health information protection legislation.

Gartner Recommended Reading

[Strategic Roadmap to the Real-Time Health System](#)

[Healthcare Provider's Unique IoT Challenges Demand a Platform Strategy](#)

[Use RTHS Principles to Guide Digital Transformation](#)

[Evolving IoT Security Risks Demand New Approaches From Healthcare Delivery Organizations](#)

Sliding into the Trough

Healthcare Consumer Persuasion Analytics

Analysis By: Kate McCarthy

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

Healthcare consumer persuasion analytics uses consumer, clinical, experiential, engagement, social, environmental and behavioral data to derive and understand needs and preferences, key motivators and influencers of individual health behaviors and outcomes. It combines this insight with advanced analytics technologies and data sciences to identify techniques and tactics to persuade consumers to undertake actions that benefit their individual health.

Why This Is Important

Consumer persuasion analytics have the potential to break through one of the biggest hurdles in the improvement of health outcomes — how to change behavior within individuals who may be uninformed, unmotivated or biased against changing unhealthy behaviors. Though this technology is in its early stages within healthcare and life sciences, the use of similar technology within other consumer-oriented industries such as retail and entertainment has demonstrated success in nudging consumer behavior.

Business Impact

The desire to influence the behavior of the healthcare and life sciences consumer continues to accelerate. This trend is evidenced by progressive organizations investing in leaders to direct behavioral change and economics. We expect the efforts of digital therapeutic companies, wellness and prevention initiatives and the chronic care management efforts of healthcare and life sciences organizations will increasingly demonstrate the value of persuasion analytics within the next five years.

Drivers

- Increased use of digital touchpoints due to COVID-19 have necessarily driven healthcare and life sciences organizations to invest in solutions that enable them to effectively leverage persuasion techniques.

- Estimates vary, but [according to research published in U.S. National Institutes of Health](#), consumers' physical environments account for up to 10% of health outcomes, clinical care accounts for up to 20% of outcomes, health behaviors account for 30% of outcomes, and social and economic factors account for 40% of outcomes. These health determinants matter more as value-based care programs shift risk and modify business model incentives.
- Population health and consumer health risk models, or tackling chronic conditions such as obesity and diabetes, require more effective consumer behavior interventions and behavior modifications. Healthcare and life sciences organizations and public health agencies seek to become as sophisticated as other consumer-oriented industries in analyzing consumer data that helps uncover both root causes of human behavior and effective nudges to change behavior.
- The ability to influence behavior and motivate action will be the key to transformative long-term management of cost and quality outcomes while also improving consumer satisfaction.
- As a result, we see growth among life sciences companies and startups in the creation of digital therapeutics that capitalize on behavioral science. We also see interest among HDOs that are embracing value-based care models and within healthcare payers who are using persuasion analytics to nudge members to undertake preventative, wellness and risk assessment activities.
- There have been demonstrated successes with opt-in by default for organ donation and gamification with continuous monitoring to encourage diabetics to smooth out their A1C levels during the day has helped reverse Type 2 diabetes.
- This year we advance this profile into the Trough of Disillusionment as adoption of persuasion analytics increases.

Obstacles

- While there is progress in deploying consumer persuasion analytics that can successfully identify and nudge people to take the next best action, the industry continues to lag more mature industries, like retail and banking.
- Most healthcare and life science organizations lack sufficient data elements on their own to effectively build persuasion analytics, and they struggle to scale digital behavior change due to insufficient technologies and processes.

- Progress will be hindered by digital ethics issues that complicate the use of healthcare data for persuasion.
- We expect the complexity of persistently influencing consumer behavior over their entire journey will delay the maturity of healthcare consumer persuasion analytics technologies.

User Recommendations

Persuasion analytics can be deployed through a variety of platforms, including EHR, CRM, MXDP and marketing technologies. However, many organizations will find legacy environments limiting given the volume and velocity of data necessary to make persuasion analytics successful.

Leading healthcare and life sciences organizations should begin experimenting with incremental solutions while preparing for investment in enterprisewide data fabric. CIOs should:

- Begin to identify opportunities for persuasion analytics by identifying use cases that require incremental nudges and lead to measurable outcomes.
- Continue to encourage leadership to develop trials that exploit short-term opportunities while establishing long-term potential for personalized engagement.
- Begin engaging vendors with both the data and data scientists who can combine epidemiology, economics and consumer behavior insights.
- Raise organizational awareness by teaming with marketing on education and influence campaigns.

Sample Vendors

CareCentra; Happify; Indegene; NextHealth Technologies; Pro-Change; Thrive Global; VAL Health

Gartner Recommended Reading

[Innovation Insight for Consumer Experiences in Healthcare and Life Sciences](#)

[Healthcare and Life Science Business Driver: Strategic Technology Change](#)

[Tool: Healthcare and Life Science CIOs Executive Presentation for Composable Data and Analytics](#)

Start Organizational Change With a From/To/Because Model

Assistive Healthcare Robots

Analysis By: Kate McCarthy

Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

Assistive healthcare robots are self-deterministic or smart machine caregivers designed to help individuals achieve a self-sustaining life by helping them move around, performing caregiving tasks and providing companionship. This profile includes caregiver support, psychological support (motivation and companionship), and healthcare delivery support for observations, monitoring, coaching or emergency action.

Why This Is Important

Assistive healthcare robotics offer promise of improved independence and safety for care in the home for disabled, aging or isolated individuals and their caregivers. According to the [International Federation of Robotics](#), the market for social robots is expected to grow 29% annually through 2022, while demand for rehab robots is projected at 45% per year in the same period. This growth is supported by the growing aging population and shortages of skilled and home workers.

Business Impact

Robots will become an essential part of delivering home healthcare. They will address worker shortages, decrease delivery costs of healthcare services, and improve quality of life for users and caregivers. Assistive robot applications will impact functions that directly supplement the healthcare and social service labor force, or provide innovative, new healthcare and personal services.

Drivers

Three industry changes underlie demand for assistive healthcare robotics:

- Increased care delivery in the home: Virtual care and enabling technologies like remote patient monitoring rose exponentially as a result of COVID-19. Increased utilization of virtual care is a lasting change that healthcare organizations must support with increased touchpoints, such as assistive robots.
- Aging population: By 2050, 1.6 billion or 17% of the total population of 9.4 billion will be 65 and older. This aging population trend is especially prevalent within European and Asian countries.
- Caregiver shortage: The World Health Organization forecasts a global shortfall of 18 million healthcare workers by 2030. Furthermore, because of the heightened imbalance of elderly to younger citizens and the national commitment to robotics in Japan, we look to that country as a bellwether of how these technologies may play out. There, robots have been assimilated into the daily lives of elderly citizens and have helped them extend their ability to age in place.

Other drivers:

- Assistive healthcare robots can be used across four categories to meet consumer and caregiver needs: household/daily care assistant robots, physical assistant robots, multipurpose standstill (or static) personal assistance robots (PARs), and multipurpose movable (or moving-capable, non-static) PARs.
- Assistive healthcare robots have relevance for the healthcare and related social and activity of daily living needs of patients in the home. The use of artificial intelligence (AI) and sensing technologies increases the potential value of this intervention.

Obstacles

While assistive healthcare robotics are growing in both interest and availability, three issues bely their mainstream adoption:

- Cost: Assistive healthcare robotics can run in the tens of thousands. When robotics are deployed in an enterprise, this cost can be absorbed across multiple patients and use cases. In the home, you must justify the cost against one patient. This cost justification both limits the types and volume of patients who can use this technology.
- Purpose: While use cases continue to grow, today's use cases are limited making widespread gains in outcomes hard to quantify.

- Availability: Assistive healthcare robotics are not widely available today.

In 2021, we continue to classify the benefit as moderate until value is demonstrated at scale. Innovations continue to power the technology's slow progress along the Hype Cycle past the Peak of Inflated Expectations. We expect the first wave of assistive robots will reach the Plateau of Productivity within five to 10 years.

User Recommendations

- Begin to experiment with the use of robots within proven use cases (companionship) and as more use cases become viable. Widespread use of robotics is inevitable, and will include an expanding portfolio of healthcare and socially assistive applications.
- Encourage innovation in government social welfare programs by developing use cases and participating in trials.
- Prepare for mobile robots to appear as new endpoints in healthcare IT networks as assistive robots reach functional ability and viable price levels. Moreover, robots may eventually be represented in IT systems as "virtual" human/provider end users of IT, with unique identifiers, workflows and information needs, as well as being unique devices with specific deployment and support requirements.

Sample Vendors

Aeolus Robotics; CT Asia Robotics; INF Robotics; KOMPAÏ robotics; NEC; PARO Robots; Seismic; SoftBank Robotics

Gartner Recommended Reading

[Emerging Technologies: Smart Robots Will Augment Human Workers, Not Replace Them](#)

[Infographic: Artificial Intelligence Use-Case Prism for the Healthcare Provider Industry](#)

[Artificial Intelligence Primer for 2021](#)

[Market Trends: 4 Technologies That Will Revolutionize Drones and Robots](#)

Genomics Medicine

Analysis By: Sachin Dev, Michael Shanler

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Definition:

Genomics medicine technology enables the use of genetic information for medical research and treatment (e.g., diagnosis, therapy, risk management). It is a component of precision medicine and focuses on leveraging genomic data and insights derived to treat patients. Technologies include gene sequencing, variance calling, high-performance computing, artificial intelligence (AI)-informed risk assessment and clinical decision support.

Why This Is Important

Genomics medicine is already saving lives, and its promise to improve health outcomes is driving adoption in healthcare. Upstream technologies supporting research and gene sequencing data collection are well developed and yield increasing amounts of efficiency in genomics. Technologies that use genetic information in clinical care delivery are progressing toward delivering quick, reliable and actionable patient-specific insights.

Business Impact

The value of genomics medicine is demonstrated across multiple areas, including:

- Targeted therapies for cancer and rare diseases.
- Accurate and patient-specific clinical diagnosis and treatment decision.
- Specific and targeted diagnostic tests based on a patient's genetic profiles eliminates or reduces extra cost.
- Precision care for prenatal and genetics-directed chemotherapy.
- The business and population health impact of genomics medicine are substantial and a key component of precision medicine.

Drivers

- Healthcare and life science organizations with notable success in genomics medicine demonstrate many genomic programs and studies to utilize the molecular-level insights, from genes to personalize treatments, and improve healthcare outcomes. The emergence of a new class of next-generation sequencers (NGS) is enabling vendors to bring new capabilities at end-user level, broadening the utilization of genetic information across multiple clinical specialties (such as chronic disease management) and beyond oncology.
- Technology and services related to genomics are steadily progressing as the cost of genomic sequencing continues to go down and as research has identified more practical uses in diagnosing and treating patients. For example, companion diagnostics is rapidly expanding in biopharma whereby an individual's receptivity for a specific medicine is measured by matching a specific genetic biomarker. Research in the field is investigating many other uses of genomics, ranging from genetic testing for rare and undiagnosed diseases, gene therapy, testing for treatment receptivity, precision cancer treatment and gene editing to "correct" for abnormalities, among others.
- Adoption will continue to grow as researchers identify more correlations between genetic biomarkers and health, disease prevention and treatments. Advances in gene discovery and specific drugs that target them (PGx) will have the most direct impact. The accelerated adoption rate of electronic health records (EHRs) now pervasively deployed throughout the world creates rich sources of health data ripe for epigenomic exploration. Data analytics, including AI techniques such as machine learning, now have great potential to aid in new discoveries leveraging that data. For these reasons, we move this profile further along on the Hype Cycle with five to 10 years to the mainstream.

Obstacles

- Progress in genomic medicine proceeds at the pace of scientific discovery. It requires decades of extensive research to translate genomic data into actionable clinical practices.
- It is equally challenging to make this knowledge actionable by physicians, as many are not well-trained to incorporate an actionable insight from genomics within their workflows.
- Although new genetic markers are constantly being discovered, they require frequent reanalysis of patients' sequencing data that hinders the development and regulatory approval of new tests, drugs and therapies.
- Researchers, life science and healthcare providers demand genomics raw sequencing data, analysis and recommendations from sequencing data are integrated in their EHR system. Interoperability remains a barrier to information exchange among scientists, providers, patients and families for collaboration and counseling.

User Recommendations

- Establish a surveillance process to stay updated with the practical use of genomics in diagnosis and treatment, and the implications for IT. Initiate discussions with peers as to whether it is worth pursuing an in-house genomics center of excellence, or outsourcing this function.
- Outline business process, compliance, laboratory, regulatory and IT implications when including genomics medicine disciplines for decisions about research, therapies and business opportunities, while ensuring patient privacy.
- Architect an IT infrastructure, inclusive of outside services, that supports the acquisition, storage, collaboration and analytics requirements demanded by genomic datasets and therapy delivery.
- Evaluate your EHR vendor for their plans to support genomics medicine needs. This includes the ability to record, store, secure and access genetic marker data from patients, and their ancestors and family members, within the individual patient's record.

Sample Vendors

DNAexus; Genedata; Helix; IBM Watson; Igenbio; Illumina (GenoLogics); L7 Informatics; NantHealth; Sema4; Seven Bridges

Gartner Recommended Reading

[Healthcare Provider CIOs' COVID-19 Cost Optimization Action Plan](#)

Cool Vendors in Life Sciences

[Healthcare and Life Science CIO's Genomics Series: Part 1 — Understanding the Business Value of Omics Data](#)

[Healthcare and Life Science CIO's Genomics Series: Part 2 — Formulating an Omics Vision](#)

[Healthcare and Life Science CIO's Genomics Series: Part 3 — Prioritizing Omics Investments](#)

Real-Time Health System Command Center

Analysis By: Sharon Hakkennes, Sachin Dev, Gregg Pessin

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

A real-time health system (RTHS) command center is an enterprise-level composition of clinical, operational and administrative dashboards powered by real-time patient event data, advanced analytics and predictive models. As the core of the RTHS platform model, the command center uses real-time operational intelligence to anticipate, optimize and orchestrate healthcare provider enterprise and network resources, workflows, and capacity in response to changing internal and external conditions.

Why This Is Important

The rise of RTHS command centers represents healthcare provider executives' need for reliable, real-time intelligence to support more precise, predictive and proactive decision making. RTHS command centers bring together visibility of operational and clinical workflows, enabling healthcare providers to holistically evaluate intersections between these previously disparate processes in a more coordinated fashion.

Business Impact

Integrated real-time and predictive operational and clinical dashboards applied to high-impact use cases is the ultimate manifestation of the RTHS paradigm. They:

- Enable adjustment of operations and response to clinical demand and risk in real time, transforming hospital management and improving patient satisfaction and outcomes.
- Eliminate unjustified variance in processes, quality and cost.

Drivers

Considerable command center development is underway — both self-developed by healthcare providers and enabled by vendor product offerings, driven by:

- Recognition by progressive health systems, who have been using departmental and domain-specific operational dashboards for years, of the value of enterprisewide command centers for systemwide use cases.
- The impact of COVID-19 in highlighting how important it is for healthcare providers to sense and understand the current operational and clinical environment in real time in order to effectively respond to rapidly changing conditions.
- The palpable quest across many countries to manage hospital demand, capacity and patient throughput management, as well as the drive for operational processes efficiency and cost control.
- The shift to virtual models of care — necessitating increased visibility of patients receiving care outside of the four walls of the healthcare facility.
- Increased availability and access to data through investment into electronic health records (EHRs) and connected devices, and the imperative to deliver value from these investments.

- Advances in artificial intelligence and machine learning, which are driving improvements in the relevance and accuracy of predictive algorithms to support proactive, data-driven decision making.

Obstacles

Several obstacles inhibit adoption and value realization for RTHS command centers, including:

- Successful implementation relies not only on solutions informing and helping healthcare providers respond, in real time, to current and future predicted hospital conditions, but also on reengineering of clinical and operational processing for continuous improvement. This represents a fundamental shift in approach for many healthcare providers.
- The market for solutions enabling RTHS command centers is still emerging, and many available solutions are relatively immature.
- Value of the insights delivered through the RTHS command center are dependent on availability and quality of data. Healthcare providers continue to experience data quality issues and challenges with access to data across multiple, disparate sources in real time. These issues impact accuracy of underlying algorithms and erode stakeholder trust in outputs.

User Recommendations

To reap the benefits of RTHS command centers, healthcare provider CIOs should:

- Set your command center initiative up for success by ensuring executive leadership support and sponsorship. Assemble clinical informatics leaders and operational and clinical subject matter experts (SMEs) to form a command center steering committee.
- Build engagement and trust across stakeholders by selecting pilot use cases that are linked to organizational strategic priorities, ensuring availability of underlying high-quality, comprehensive, datasets.
- Enable and orchestrate the successful use of a RTHS command center by deploying process engineering capabilities, such as lean principles, across medical, nursing and supporting resource teams.

- Ensure the outputs from the command center drive proactive decision making and actions by embedding alerts and escalation processes into clinical and operational workflows.

Sample Vendors

Care Logistics; Central Logic; Cerner; Epic Systems; GE Healthcare; Philips; TeleTracking; Transforming Systems

Gartner Recommended Reading

[Real-Time Health System Vision](#)

[Use RTHS Principles to Guide Digital Transformation](#)

[2021 Strategic Roadmap for the Real-Time Health System](#)

[Healthcare Provider CIOs: Shift Interoperability Strategy From Moving Data to Orchestrating Workflow](#)

[Put Patient Throughput and Capacity Management at the Center of Your Performance Improvement Plan](#)

PHI Consent Management

Analysis By: Mike Jones

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Protected health information (PHI) consent management is the combined system, process and set of policies for consumers to establish how care providers can access or exchange their health information. Individuals can confirm participation in patient portals and health information exchanges (HIEs), and dynamically update granular privacy, access and usage preferences for their health data.

Why This Is Important

PHI consent management provides patients, providers and health organizations with the confidence that health information is protected regardless of where or how it is utilized. Health organizations must ensure that transparency is built into their electronic record systems (e.g., their HIE or local electronic health record [EHR]), and is present within the interoperability solutions that permit the exchange of information among care providers, payers and other third parties.

Business Impact

- Without effective PHI consent management, it is difficult to scale the secondary use of health data for population health, clinical trials, precision medicine, and genomics or algorithmic medicine
- Healthcare providers must ensure permitted use policies are retained as PHI moves between entities. Intended use policies, for which the disclosing provider remains accountable, should not be overridden by downstream systems.

Drivers

- The development of new capabilities for PHI consent management has been accelerated by continuing regulatory shifts across the privacy landscape at the regional, country and state levels. This is further compounded by increasing consumer demand for transparency on how health data is processed and shared outside of the immediate care delivery domain (e.g., for research into vaccines or for recruitment of patients into clinical trials).
- Improvements and increased adoption of interoperability standards and networks across the healthcare provider sector are leading to a greater number of systems and workflows that can now share health information (e.g., [ONC 21st Century Cures Act Final Rule Announcement Summary](#)).
- There has been an increase in the funding and formation of national and regional HIEs in many regions outside of the U.S. where shared care records are part of national or regional healthcare reforms.
- International efforts to tackle COVID-19 pandemic have led to massive demand for information-sharing platforms to provide cross-border access to PHI for vaccine development, measuring the interventions' effect, measuring treatment outcomes, and planning vaccine distribution and digital certificates or vaccine passports.

- As a result of increased global interest in privacy and protection of citizen data, and the increased threats and risks that result from ineffective PHI protection, we have advanced this profile toward the Slope of Enlightenment.

Obstacles

- Central to most privacy laws is the challenge of providing users clarity about control over their personal data. Translating these regulations into operational systems and protocols for a variety of regions means that vendor solutions often require considerable configuration prior to deployment.
- Many organizations have found themselves constrained by their product choices within 12 months of deployment as demand for additional capabilities develops rapidly due to market shifts and a greater need for granularity in first-party consented data.
- Capabilities chosen and deployed in isolation of consultation with patients and providers are rarely representative of consumer needs, resulting in weak adoption, and loss of time and investment.

User Recommendations

CIOs, CMIOs and those involved in information privacy, security and compliance (e.g., CISOs) should:

- Review regional legislation, and determine what is required from internal systems to reach and remain compliant with PHI protection clauses.
- Evaluate existing application portfolios to determine how these systems record consent and authorize users or external systems to access PHI.
- Identify the target level of transparency through analysis of customer preferences and documenting consumer expectations.
- Avoid purchasing an overly “fitted” solution by defining a clear list of requirements based on future, rather than immediate, needs.
- Offset the volume of subject right requests commonly associated with modern privacy regulations by advancing the maturity of the organization’s PHI consent management offering from reactive toward a self-service model.
- Build a strong business case by addressing emerging requirements early in the process through collaboration with clinical leadership.

Sample Vendors

Deloitte; Global Public Inclusive Infrastructure (GPII); InterSystems; IQVIA; Jericho Systems; OneTrust; Optum; ZeOmega (HealthUnity)

Gartner Recommended Reading

[Proactively Protect Patient Information With IGA and PPM](#)

[Healthcare CIOs: Prepare for Granular Patient Consent](#)

[Contact Tracing Apps Demand the Reshaping of Consumer Privacy Rules](#)

[7 Critical Domains of a Successful Healthcare Provider Interoperability Strategy](#)

Digital Analytics Architecture

Analysis By: Jeff Cribbs

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Digital analytics architecture for healthcare providers represents the next-generation approach to derive value from data. Traditional provider analytics architecture typically includes information portals (reports and dashboards) and an analytics workbench (data exploration). Digital architecture adds data science and machine learning platforms (for advanced modeling), and a decision hub (to deploy real-time insight into operations), and coordinates all four functional elements.

Why This Is Important

The healthcare industry has experienced rapid digitization and, with that, accelerated demand for new data management and analytics capabilities. Because no single vendor today will be able to fulfill all the analytic demands of a health system, the analytics architecture must be designed to adapt to an ever-changing spectrum of use cases and consumption modalities. This spectrum ranges from dashboards to process automation.

Business Impact

The effectiveness of a healthcare provider's analytics architecture is paramount to succeeding in both managing care and cost, through effective patient and clinician engagement. This architectural approach is a necessity for HDOs to be able to pervasively influence actions, often in real time, across operational, clinical, and business processes.

Drivers

- Healthcare providers increasingly acknowledge advanced analytics generally, and artificial intelligence in particular, as critical enterprise competencies.
- Megasuite EHR vendors continue to build out their analytic capabilities. This includes both marketplaces with prebuilt analytic models and reporting and development environments for local models. This trend has the dual effect of normalizing the use of analytics in clinical and administrative workflow while also clarifying the ongoing need for more adaptable analytics architecture outside of the EHR.
- The continued growth in the volumen, variety and velocity of data sources originating outside of the EHR (such as remote monitoring devices, genomic data, asset tracking and computer vision).
- Healthcare analytic vendors are significantly updating their architecture to support more complicated data needs and advanced analytic demands.
- We advanced digital analytics architecture for healthcare providers moderately this year, largely in acknowledgment of accelerated investment in data science and machine learning. We expect it to move through the Trough of Disillusionment over the next two years, with a focus on the decision engineering needed to make analytic insight much more pervasive in clinical operations and administrative operations.

Obstacles

- A lot of providers' data and analytics investments are focused on urgent, departmental capability gaps. These capabilities are typically supported in a segmented fashion — either with canned reporting or with sophisticated data science and machine learning. So long as these analytics capabilities are not enabled by a common architecture, they will remain in silos and deliver diminished business value. However, identifying this gap requires a view across departments and use cases. Often, the data and analytics leaders that have that view, do not have the budget or decision making authority to advocate for the best architectural investment.
- Many organizations will see “lower hanging fruit” in cleaning up existing data, reducing latency of key reports and dashboards, or initiating fundamental data literacy programs. These initiatives will compete for limited budget dollars with longer term investments in architecture.

User Recommendations

- Prepare executive leadership as neither the legacy enterprise data warehouses (EDWs) nor the megasuite EHR will be sufficient to manage the data and analytics requirements to be competitive in the healthcare provider market today.
- Ensure that data and analytics has prominent placement in your organization's business and technology strategy. Gartner's data and analytics operating model is a good blueprint.
- Address organizational structures that are inhibiting progress toward digital analytics architecture. While the right organizational structure will vary substantially based on the business and operating model, all organizations need a data and analytics leader with a cross-departmental purview. They also need a decision-making authority and budget to prioritize digital analytics architecture across the enterprise.

Sample Vendors

Cerner; Dimensional Insight; Epic; Health Catalyst; Information Builders; MedeAnalytics; Oracle; SAS

Gartner Recommended Reading

[Toolkit: Creating a Modern Data and Analytics Strategy and Operating Model](#)

What Is Data Fabric Design?

Drive a New Data and Analytics Architecture to Match Your Digital Healthcare Provider Needs

Case Study: KPI-Led Data and Analytics Digital Transformation (St. Luke's)

Healthcare CRM

Analysis By: Kate McCarthy

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Customer relationship management (CRM) systems facilitate, support and enable the management of relationships with individuals by tracking, recording and managing moments of engagement. CRM capabilities are a feature of multiple systems including marketing, EHRs, claims payment, clinical trial management systems and independent CRM systems.

Why This Is Important

Advanced healthcare organizations are recognizing the proliferation of CRM systems and have begun adopting an enterprise approach to CRM deployment by implementing consolidated CRM platforms or consumer engagement hubs. These create and support a relationship with individuals over multiple communication touchpoints and episodes of care, and across care settings. Investments in CRM systems continue to accelerate as many healthcare organizations seek to improve consumer engagement initiatives.

Business Impact

- Increased new revenue from attracting, engaging and converting consumers into members, patients and trial participants.
- Improved revenue retention, outcomes and patient experience from engagement of patients
- Increased patient satisfaction scores along with reduced complaints to public or private payers and large employers.
- Improved chronic disease management patient outcomes by ensuring appropriate-interval visits.

Drivers

- CRM has emerged as a critical tool to engage individuals in wellness, prevention and chronic care management. The attraction, conversion and retention capabilities of CRM systems have become a minimum requirement for competitive healthcare organizations.
- Healthcare organizations need systems that can create a longitudinal perspective of an individual's health. Creating this 360-degree view of the healthcare consumer is the benchmark for other highly consumerized industries that healthcare and life science organizations increasingly aspire to emulate.
- CRM can help lower costs and improve outcomes by enabling engagement across touchpoints for healthcare consumers within their wellness, prevention and chronic care management efforts.
- CRM enables improved relationship management. In healthcare, this means optimized delivery networks through the management of provider relationships and interactions and precision marketing efforts to attract and convert consumers for specific service lines or facilities.
- When successfully deployed, CRM enables deeper relationships with affiliated physicians, business partners, suppliers and benefactors, as well as improved recruitment and retention of patients as they traverse complex healthcare ecosystems.

- The use of AI bots, robotic process automation and speech interfaces accelerates the need for a CRM system to document and manage an increasingly digital relationship with consumers. The use of AI and machine learning (ML) enables the analysis of engagement across the multiple communications channels, care settings, episodes of care and business partners that are part of the health journey. AI allows healthcare organizations to gain unprecedented insight into the behavior of healthcare consumers and how to influence them.

Obstacles

- Although a modern approach to CRM comparable to consumer industries is desirable, progress within healthcare has been slow. This is due to the complexity of an individual's healthcare journey as they interact with a wide number of organizations combined with regulatory barriers that hinder sharing of information.
- A fragmented healthcare journey often results in multiple mixed messages from varied groups being sent simultaneously to consumers causing the degradation of consumer trust.
- Reconciling CRM into legacy systems, such as EHRs and core administration platforms, is challenging and can result in unnecessary data replication and cost.
- We anticipate healthcare organizations will accelerate implementation of CRM solutions over the next five years. However, the complexity of an enterprise approach to longitudinal consumer engagement moves this technology to the Trough of Disillusionment and will delay achieving the vision of retail-equivalent CRM techniques for at least two to five years.

User Recommendations

- Identify opportunities to use CRM whenever a relationship must be established, such as in chronic disease management, sales and provider network management.
- Reduce the risk of having multiple systems attempting to manage a relationship with a consumer by creating a framework for longitudinal relationships that harmonizes engagement across an increasing number of disparate CRM systems.
- Leverage an implementer, such as an SI, that has demonstrated success with the vendor you have selected. This will ensure improved reconciliation of systems and processes and speed time to value.

Sample Vendors

Creatio; hc1; Healthgrades; Microsoft; Oracle; Pegasystems; Salesforce; Sequence Health; Tea Leaves Health

Gartner Recommended Reading

[The Eight Building Blocks of CRM: Strategy](#)

[Innovation Insight for Consumer Experiences in Healthcare and Life Sciences](#)

[The Elusive CRM Magic Quadrant](#)

[2020 Planning Guide for CRM and Customer Experience](#)

[The Evolution of Healthcare Consumer Engagement Hub Architecture](#)

[Toolkit: The Gartner CRM Maturity Model](#)

[Magic Quadrant for CRM and Customer Experience Implementation Services](#)

PTCM

Analysis By: Barry Runyon

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Patient throughput and capacity management (PTCM) offers a less-siloed approach to orchestrating and managing patient flow and care transitions. PTCM systems include bed management, patient flow, transfer centers, staff scheduling and referral management. PTCM systems anticipate demand, are alert to bottlenecks, monitor conformance with clinical pathways and performance objectives, and balance hospital resources with demand as circumstances change.

Why This Is Important

The value of optimizing patient flow and managing capacity is well-understood by healthcare provider leadership. Managing patient throughput and the utilization of facilities, staff and materials are persistent hospital operational and strategic priorities and underlie most cost optimization initiatives. While many healthcare providers have invested in stand-alone bed management and patient flow solutions to address these challenges, PTCM represents a more integrated, next-generation approach.

Business Impact

The PTCM value proposition includes:

- Advancing clinical operations performance and improving key performance measures (e.g., bed occupancy rate, length of stay, asset utilization, time to service, operating margin) and the patient experience.
- Delivering higher patient throughput and enhanced resource utilization and revenue at lower resource costs by eliminating waste and delays.
- Facilitating value-based care and bundled payment models that reward favorable PTCM key performance measures.

Drivers

- The need to improve key performance measures, such as patient waiting times, length of stay, lost admissions, cost per encounter, readmission rate, unnecessary lateral moves and diversion hours.
- The need to increase key performance measures, such as bed utilization, patient revenue, interfacility transfers, direct admits, and staff and resource utilization.
- The need to recover revenues affected by the COVID-19 pandemic.
- Command center departmental and enterprise dashboards are sourced from many operational disciplines and independent sources. PTCM solutions are key contributors, as command centers continue to gain traction.
- More pervasive and precise RTLS, sensor technologies and real-time analytics are available to position and track patients and care team members and to lend insight into their interaction patterns.
- PTCM solution vendors are beginning to expand their footprint across the entire care continuum, from virtual care encounters to postacute care venues.

Obstacles

- More sophisticated interoperability with IoT devices will be necessary to acquire location- and condition-sensing data to inform real-time analytics.
- Integrated PTCM platforms require reskilling, reassignment and centralization of PTCM responsibilities (e.g., bed assignments) and optimizing the use of EHR-generated data to refine patient throughput algorithms.
- The increasing number of HDO priorities, executives' reluctance to entertain new risks, nursing leadership's willingness to lead, and the need for stronger collaboration between nursing and physician leaders of emergency departments and ICUs.
- The realization of current vendor R&D plans (e.g., predictive algorithms, increased interoperability, synthesis and contextualization of situational awareness data for real-time decision making) and more proof-of-value studies.

User Recommendations

- Identify a chief nursing informatics officer (CNIO) to provide leadership in the planning and implementation of PTCM solutions and technologies.
- Establish an enterprisewide PTCM strategy and roadmap by engaging key stakeholders, such as admissions, transition management, referral management, workforce management, discharge planning and the emergency department. The most significant stakeholder is nursing operations.
- Share work and data among systems participating in PTCM workflow by advancing enterprise interoperability capabilities.
- Increase the likelihood of PTCM success by increasing your understanding and use of vendor proprietary and open APIs that provide more granular access and control than conventional messaging interfaces.
- Begin to materialize your PTCM vision by selecting a patient flow system with the strategic intention and technical architecture necessary to fulfill the broader PTCM vision.

Sample Vendors

BedWatch; Care Logistics; Central Logic; GE Healthcare; LeanTaaS; QGenda; TeleTracking

Gartner Recommended Reading

[Healthcare Provider Command Centers Advance Real-Time Digital Care to Improve Efficiencies](#)

[Put Patient Throughput and Capacity Management at the Center of Your Performance Improvement Plan](#)

[Healthcare Provider CIOs: Advance Clinical Operations Performance Through Situational Awareness Technologies](#)

Contact Tracing Apps

Analysis By: Sharon Hakkennes, Mike Jones

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Adolescent

Definition:

Contact tracing apps support the identification and notification of individuals who have been in close proximity to another individual who has tested positive for a pathogen. Enabling technologies vary between solutions and include location-based technologies (e.g., Bluetooth, GPS) and QR code scanning. If a person becomes infected, information collected through the app is used to identify and alert their recent contacts to the exposure, directly through the app or through manual processes.

Why This Is Important

Contact tracing is the process of determining who has been in contact with an individual who has tested positive for a pathogen. It enables early diagnosis and management, and when combined with physical isolation, it is critical in the fight against the spread of infectious diseases. There are many limitations to the underlying technology and privacy issues relating to contact tracing apps. As a result, they are, at best, a complement to, not a replacement for, manual contact tracing efforts.

Business Impact

While contact tracing apps are not a panacea for contact tracing, they have demonstrated utility across the following areas:

- Decentralized apps that automate notification of exposure serve as an adjunct to manual contact tracing. Particularly in instances where the pathogen is uncontained and timely manual contact tracing is impossible.
- Centralized apps that collate and report contacts of an infected individual reduce the time and manual effort required to identify and notify close contacts.

Drivers

- Adoption is occurring at both the government and enterprise levels as efforts continue across the globe to contain the spread of the COVID-19 virus and support safe reopening. Over 70 countries have now deployed contact tracing apps.
- Apple and Google partnered to develop contact tracing technology. In May 2020, they released the Exposure Notification API (application programming interface) to support decentralized government contact tracing apps. The technology has now been incorporated into the operating systems of their respective smartphones. The API is designed to respect user privacy and security, using a decentralized approach to automatically notify individuals of potential exposure without sharing any personal information.
- Following the failed deployment of a contact tracing app using a centralized approach, the NHS in the U.K. went live with an app leveraging the Exposure Notification API and quick response (QR) code check-in capabilities in September 2020. Data released by the NHS in February 2021, suggest that 1.7 million app users across England and Wales were advised to isolate following close contact with an individual who has tested positive. The analysis estimated that the app may have prevented around 600,000 additional cases of COVID-19.
- Other countries that have deployed apps using QR codes include Australia, New Zealand and Singapore. Upon entry into designated facilities (e.g., restaurants, shopping centers, gyms), individuals are required to check-in by scanning a QR code. Should an individual subsequently test positive for COVID-19, the digital register of individuals at any sites visited during the infective period of the positive case is accessed for the purposes of contact tracing.
- As mass vaccination efforts continue across the globe, we expect to see renewed interest in contact tracing and digital solutions to support reopening efforts through containment of community transmission.

Obstacles

- Variable accuracy of apps leveraging location-based data due to external factors influencing signal strength (e.g., the type of phone being used, where the phone is relative to the person and environmental factors).
- Achieving the required level of adoption by the target population to avoid false negatives. This relies on individuals not only downloading the app, but also using it as a matter of routine.
- Technology limitations, including the ubiquitous access to phones capable of meeting the minimum operating system requirements, issues of battery drain for location-based apps.
- The region-based development of contact tracing apps, along with distinguished data protection laws used in different countries and regions resulting in disconnection between contact tracing apps and a lack of interoperability.
- Significant privacy concerns, particularly with regards to the use of centralized approaches where data collected is uploaded to a centralized server for contact matching and risk analysis.

User Recommendations

- Ensure realistic expectations are set with regards to the benefits of deploying a contact tracing app by level setting all stakeholders on their limitations, risks and utility.
- Determine if and which solution meets your specific requirements by developing an evaluation framework based on predefined goals and measures of success in the context of your overall pandemic management strategy.
- Adopt a privacy-by-design (PbD) approach by working closely with privacy and legal departments to agree on the processes for consent, protection of an individual's identity and the management, sharing, retention, and disposal of data.
- Build trust and maximize adoption by ensuring your deployment and associated communication strategy are founded on principles of transparency, consistency and accountability. Pay attention to areas of privacy and security, and clearly articulate what safeguards have been implemented to protect personal information collected through the app.

Sample Vendors

Apple; Google; NOVID; PricewaterhouseCoopers (PwC); SaferMe; WeHealth

Gartner Recommended Reading

[Contact Tracing Apps Demand the Reshaping of Consumer Privacy Rules](#)

[Case Study: TraceTogether – Contact Tracing in Singapore \(Government Technology Agency of Singapore\)](#)

[Curbing Contagion in the Office: Contact Tracing, Masks and Temperature Screening](#)

[Manage Social Distancing and Contact Tracing With Location-Aware Technologies and Devices](#)

Patient Portals (Untethered)

Analysis By: Sharon Hakkennes, Veronica Walk

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Patient portals enable a secure digital patient-provider communications channel that provides access to clinical, financial and administrative functionality; educational information; and personal health maintenance tools. This profile tracks patient portal technologies that are untethered from an electronic health record (EHR). Untethered portals provide access to both EHR data and a wide range of tools and services beyond the EHR.

Why This Is Important

For healthcare providers, the increasing adoption of virtual care services has served to heighten the importance of digital patient engagement. Patient portals are an important component of an overarching consumer engagement strategy. Untethered patient portals are the optimal solution for providers with multiple EHRs that lack adequate portal functionality or those with a desire to differentiate on consumer engagement.

Business Impact

Untethered patient portals provide many benefits, including:

- Improving patient engagement, activation and satisfaction while also increasing patient physician and healthcare system loyalty.
- Providing patients more meaningful and lasting involvement with their health and treatment plans.
- Generating insights into individuals that can be the underpinning of effective wellness, prevention and chronic care management campaigns — thereby making them the cornerstone of a personalized health strategy.

Drivers

- EHR-tethered portals are frequently criticized for their limited number of services and accessibility challenges. In contrast, untethered portals are not limited to providing patients access to services offered by an EHR and thus offer a more personalized consumer experience.
- Increasing healthcare provider interest in untethered portals is being driven by their relative advantages, including the following abilities: (1) to enable patients to access data and services without needing to have a preexisting patient ID or forcing them to authenticate using passwords; (2) for healthcare providers, to present an unlimited number of health and healthcare services to consumers through their choice of best-of-breed solutions; (3) for patients, to see their data aggregated across multiple providers and their use of different vendors or instances of an EHR; and (4) to collect a wide range of consumer-generated health data, including biometric monitoring, patient-reported outcomes and environmental monitoring.
- Outside the U.S., untethered patient portals are the leading portal choice for healthcare providers because of the need to integrate with multiple EHRs, patient administration systems, social services, wellness and prevention services, and chronic care management systems.
- Countries and regions including Denmark, Estonia, Sweden, Andalusia (Spain), Lombardy (Italy) and the U.K. are also driving adoption of untethered patient portals. These stand-alone portals have experienced substantially higher adoption by citizens. For example, the Denmark Sundhed.dk portal has more than 1.7 million unique users (31% of the population) using it each month.

Obstacles

- From a patient perspective, barriers to adoption include a preference for in-person communication, poor digital and health literacy, lack of awareness and perceived benefit, internet access, and privacy concerns.
- For healthcare providers who have made significant long-term investments into EHR solutions, justifying the time and cost required to transition to an untethered portal is a significant barrier to adoption.
- Technical challenges are also impeding adoption of untethered patient portals. This includes challenges with achieving required interoperability, especially with core EHR solutions and complexity in the vendor landscape. A variety of different solutions exist, such as dedicated patient engagement solutions, low-code platforms and multiexperience platforms, and healthcare providers may require more than one solution to meet all their patient portal requirements.

User Recommendations

- Choose the right vendor partner(s) for your untethered portal by evaluating solutions against your long-term consumer engagement strategy. Prioritize patient experience and multiexperience engagement capabilities.
- Accelerate time-to-value realization by taking an agile approach to development. Deploy a minimum viable product and continuously iterate and improve your solution based on consumer feedback and lessons, and changing business and clinical requirements.
- Drive adoption by identifying and mapping different consumer personas and identifying their unique preferences and barriers. Develop a tailored marketing strategy aligned to each of your identified personas and engage clinicians to support delivery of these messages.
- Maximize portal utilization by building a comprehensive support model including processes to support patient onboarding, education in portal use and addressing technical issues. Ensure adequate resourcing to support these processes.

Sample Vendors

Appian; Bridge Patient Portal; Get Real Health; Medix; OutSystems; Pegasystems; Progress; SymphonyCare; TriFin Labs

Gartner Recommended Reading

[It's Time for Healthcare Delivery Organizations to Adopt a Digital-First Strategy](#)

[Healthcare Provider CIOs: Bridge the Virtual Care Divide Between Provider- and Consumer-Directed Care](#)

[Innovation Insight for Consumer Experiences in Healthcare and Life Sciences](#)

[The Evolution of Healthcare Consumer Engagement Hub Architecture](#)

[Magic Quadrant for Multiexperience Development Platforms](#)

[Magic Quadrant for Enterprise Low-Code Application Platforms](#)

Climbing the Slope

Real-Time Physician Documentation Improvement

Analysis By: Sachin Dev

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Definition:

Real-time physician documentation improvement (RTPDI), also known as computer-assisted physician documentation (CAPD), optimizes clinical documentation by leveraging artificial intelligence (AI) technologies like natural language processing (NLP), speech recognition and rule engines. RTPDI augments clinicians' documentation in real time at the point of care, as opposed to computer-assisted coding (CAC) and computer-assisted clinical document integration (CACDI) solutions.

Why This Is Important

RTPDI augments human intelligence and provides insights to clinicians at the point of service. This enables clinicians to accurately capture the severity and acuity of each patient in real time, thereby minimizing the documentation-cognitive load. The tool also helps address the increasing complexity of reimbursement requirements that vary for each payer, captures complete and accurate clinical documentation, and ultimately ensures accurate, timely billing and regulatory compliance.

Business Impact

The main value of RTPDI is revenue and efficiency improvement. Benefits include:

- Improved case mix index (CMI), a revenue factor in many payment models
- Real-time capture of rendered services, clinical complexity and severity
- Administrative and clinical efficiencies such as improved coding accuracy and fewer physician queries
- More accurate data collection of quality and core measures under value-based care
- Patient record surveillance that triggers care coordination and population health activities

Drivers

- Advancements in the NLP, machine learning (ML) and AI underpinnings of RTPDI have shown considerable improvement in revenue cycle management (including denials) and clinical documentation while lowering physician burnout and medical error rates. This, coupled with advancements made by vendors with the use of mature RTPDI algorithms and clinical language understanding (CLU) to interpret and identify gaps in clinical documentation, speeds RTPDI's progression along on the Hype Cycle.
- Improved integration of RTPDI with electronic health records (EHRs) has enabled clinicians to access real-time, evidence-based insight without having to use multiple systems, and that in itself has become a strong facilitator in improving the adoption rate among medical professionals.
- An exceptional value of streamlining the documentation process is that physicians can spend more quality time with their patients as opposed to documentation and this ultimately reduces physician burnout.
- Vendors are accelerating their innovation given growing pressure on healthcare delivery organizations (HDOs) to increase revenue, improve margins and act early to manage outcomes under value-based care models. RTPDI is very important to the overall management of revenue cycle operations and clinical documentation. However, we rate its relative value as "moderate," recognizing that RTPDI is an adjunct to other transformational and high-value systems, such as patient financial system (PFS), medical encoders, EHRs and CDI programs, for cumulative impact on revenue improvement.

Obstacles

- Clinicians expect absolute accuracy with every transaction, so they are still building trust in RTPDI technology. Physicians and clinical staff are trained to apply logical and evidence-based multidimensional thinking while treating their patients. The lack of visibility into the rule and "black-box algorithms," and without understanding the what, why and how behind the technology deter many clinicians from gaining confidence or endorsing the technology.
- The lack of RTPDI integration into clinical workflows (often due to the unique nature of clinical specialty workflows) hampers the sustainability of clinical documentation improvement across the large medical staff.

- RTPDI as a tool mainly emphasizes missing documentation without clearly applying the evidence-based clinical practices. Therefore, physicians can see this as an extra step in completing clinical documentation as opposed to seeing the true value delivery when compared to the real-world skill sets of physicians.

User Recommendations

EHR voice recognition, CAC and maturing clinical documentation improvement (CDI) technology have all pushed RTPDI adoption. However, CIOs should ensure that:

- Chief medical informatics officers (CMIOs) and health information management (HIM) leaders share responsibility for clinical data integration and RTPDI strategy, planning and implementation. Starting small with ambitions to scale, picking target medical specialties carefully and incentivizing clinician adoption must be the way forward.
- CMIOs and HIM leaders find the balance between revenue optimization and physician productivity. Demands on physicians to improve revenue and quality outcomes while lowering downstream administrative costs require physician-facing, time-saving tools such as RTPDI.
- Clinical and business executive leaders establish RTPDI KPIs, such as efficiency and financial performance. CIOs should align the design and adoption of RTPDI features and automation protocols to meet these documented outcomes.

Sample Vendors

3M-M*Modal; Artificial Medical Intelligence (AMI); Dolbey; HITEKS; Nuance

Gartner Recommended Reading

[Healthcare Delivery Organization CIOs Must Accelerate Revenue Cycle Optimization to Meet Financial Goals](#)

[The Healthcare Delivery Organization CIOs' Guide to Computer-Assisted Coding](#)

[Create a Patient-Centric Revenue Cycle by Addressing 6 Critical RCM Shifts](#)

Population Health Management Solutions

Analysis By: Jeff Cribbs

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Population health management (PHM) solutions is a set of IT capabilities and related services that enable healthcare organizations to achieve health, cost and experience goals for a discrete population of individuals. These capabilities commonly include data integration, performance analytics, care management, and patient engagement.

Why This Is Important

Many global health systems struggle with a common set of challenges: rising medical costs, disparities in access, uneven outcomes and aging populations. These trends drive further adoption of the PHM operating model. Technology solution design for PHM, particularly for healthcare providers, is complicated by a lack of comprehensive PHM vision from HDOs, PHM capabilities that overlap with adjacent spaces (like EHR, CRM and HIE), and confusing vendor hype.

Business Impact

Fully implemented PHM technology will enable improvement in most aspects of healthcare operations. However, at-risk organizations typically deploy PHM progressively as they gain experience in value-based care, learn more about the technology, and find more of their financial incentives reliant on successfully operating in a PHM model. The typical progression, in order, is: 1) data management 2) reporting 3) performance management 4) workflow (care management) and 5) patient engagement.

Drivers

- Value-based care in both public and privately funded health systems continues to accelerate. More organizations are signing at-risk contracts and there is more money at stake in renewing those contracts. In the U.S., patient membership in risk-based accountable care organizations (ACOs) [grew](#) by 24% from 2017 to 2020.
- National eHealth initiatives often include more mature PHM capabilities — such as the integration of health and social care, community-based care coordination, and remote patient monitoring.
- Business models are changing incrementally, and organizations often install initial technology support without a full vision of PHM capability. The vendor market has adapted, however, and many offer a sequential playbook and modular capabilities to better align to roadmap stage and progress.
- In recognition of this momentum, we advance population health management solutions substantially in 2021 into early mainstream market maturity. We estimate 30% adoption among the healthcare organizations that will ultimately fully adopt this technology.

Obstacles

- HDOs often make PHM investments very narrowly to support the new requirements of a value-based contract or initiative. These would include acquisition of claims data, management of an attribution patient registry, or certified quality reporting. The lack of a comprehensive PHM technology vision means initial capabilities are often not forward compatible with new capabilities or requirements.
- Megasuite EHR vendors offer PHM capabilities, but they often do not keep pace with more mature PHM program requirements.
- Efforts to configure the EHR for PHM compete with a long list of conventional care delivery-focused EHR optimization projects.

User Recommendations

- Ensure immediate PHM solution decisions are compatible with a robust population health vision that extends at least five years into the future.
- Evaluate your incumbent EHR vendor objectively by asking for their reference clients with the most mature population health implementations. Then compare those experiences with PHM vendor references with similar levels of program maturity.
- Evaluate the vendor's support model beyond the technical nuts and bolts. Understand their commitment to helping you transform your operations and achieve your targeted PHM objectives.
- Explore each vendor's built-in SDoH capabilities and ability to incorporate new external sources as best practices continue to advance.

Sample Vendors

Arcadia; Cedar Gate Technologies; Forward Health Group; Health Catalyst; IBM Watson Health; Innovaccer; Lightbeam Health Solutions; Optum

Gartner Recommended Reading

[Gartner Population Health Management Framework for Healthcare CIOs](#)

[Healthcare Provider CIOs Need to Stay on Course and Procure a Population Health Solution](#)

[Cerner HealthIntent 2020 Update: Getting Serious About Data Integration and Operationalizing Population Health Management](#)

[Market Guide for Healthcare Provider PHM Solutions 2020 Update: Moving to Connected Care](#)

Enterprise EHR Systems (Non-U.S.)

Analysis By: Mike Jones, Sharon Hakkennes

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Enterprise electronic health records (EHRs) are clinical systems optimized for use in acute care, ambulatory or outpatient clinics. They capture and maintain patient-centric information about health status and care, support tasks and events directly related to patient care, facilitate clinical pathways and documentation, and provide clinical decision support. This profile tracks non-U.S. adoption of enterprise EHRs.

Why This Is Important

Enterprise EHRs provide a broad set of capabilities spanning clinical documentation, scheduling, clinical decision support, computerized physician order entry, e-prescribing and analytics. These capabilities are critical for healthcare providers who want to optimize care quality and safety through data-driven improvement. The level of EHR adoption needs to increase in non-U.S. regions to achieve the quality, safety and access goals of healthcare providers and government health systems.

Business Impact

An enterprise EHR system can provide support for a wide variety of clinical activities that affect all caregivers and patients. It can reduce the rate of medical errors, eliminate unwarranted practice variations, improve operational efficiency and compensate for the shortage of skilled healthcare workers. Although the potential benefits are considerable, it takes substantial planning, money and vendor collaboration to obtain the full value of an EHR.

Drivers

- Regulatory and policy drivers include the need for electronic record sharing across health and social care agencies to support safe transitions of care.
- Population health management requires that EHRs provide a source of data for risk stratification and a tool for carrying out recommended actions and activities for specific cohorts of individuals.
- Improved revenue cycle charge capture is a key driver in many regions as EHRs enable coding and billing at scale.
- EHR adoption is most active in Australia, Canada, the U.K., Germany, Switzerland, Latin America, parts of the Middle East and Benelux and Nordic regions.
- EHR adoption has continued to expand globally as governments encourage their use and more hospital leaders recognize the value of fully integrated EHRs.
- Sales cycles remain very long and procurements complex. With COVID-19 being the main focus of attention for healthcare providers in 2021, a number of large regional EHR procurements and in-flight implementations have been stalled or stopped indefinitely due to spending pressure on other priorities.
- For these reasons, we have advanced this profile marginally toward mature mainstream adoption, as rates outside the U.S. are now above 20% but generally below 50% in the majority of countries.

Obstacles

- Time to value (or ROI) for an enterprise EHR is typically five years or more from initial strategy formulation to benefit realization.
- Total cost of ownership (TCO) is significant and systems require advanced levels of configuration and adoption support requiring ongoing investment.
- The main focus of attention for healthcare providers in 2021 and 2022 will be COVID-19 pandemic recovery. Funding for large regional EHR procurements and in-flight implementations have been stalled in many regions.
- SaaS-based EHR solutions are not mature yet outside of the U.S., which means more traditional capital expenditure programs are needed for implementation.
- Sales cycles remain long and procurements complex
- Alternative clinical system architectures are becoming more popular. Vendors of these approaches offer more affordable cloud-based SaaS solutions for modular packaged capabilities, such as e-prescribing, virtual care and clinical care records.

User Recommendations

- Work with senior clinical leaders to help promote the benefits of these systems and to also ensure that their organizations have fully understood what is involved in implementation and benefit realization.
- Evaluate vendors in terms of benefit, cost and risk, noting that each vendor has a different profile when it comes to TCO, usability and the speed at which benefits are realized.
- Adopt a life cycle approach from initial strategy through to selection and optimization once deployed. Use [Toolkit: Best Practices for EHR Success – Life Cycle Stage 5, Operate and Evolve](#) to do this.
- Establish clinical informatics roles, including a CMIO partnered with a chief nurse and midwifery officer (CNMIO) to ensure that deployment, adoption and clinical content life cycle management work are accomplished.
- Focus optimization activities on creating evidence-based order sets and care plans, defining clinical workflows to reduce unnecessary and unwarranted variation in care.

Sample Vendors

Allscripts; Cambio Healthcare Systems; Cerner; ChipSoft; Epic; InterSystems; MEDITECH; Philips; System C; TietoEVRY

Gartner Recommended Reading

[Toolkit: Best Practices for EHR Success — Life Cycle Stage 3, Select](#)

[Toolkit: Best Practices for EHR Success — Life Cycle Stage 4, Deploy](#)

[A Healthcare Provider CIOs Playbook on Lessons Learned From Global Electronic Health Record Projects](#)

[Gauge Readiness and Mitigate Risk to Succeed in EHR Implementations](#)

[Healthcare Provider CIO Top Actions for 2021: EHR Optimization](#)

[Market Guide for Enterprise Electronic Health Record Solutions](#)

Patient Self-Scheduling

Analysis By: Sachin Dev

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Early mainstream

Definition:

Patient self-scheduling applications allow patients to conveniently identify and locate an appropriate provider, specify a preferred appointment date and time, book an appointment, receive immediate confirmation and conveniently cancel or reschedule a confirmed appointment all in real time. This technology includes stand-alone solutions along with systems integrated with an EHR and patient access tools.

Why This Is Important

Patient self-scheduling is a high-value technology that improves patient experience by leveraging intelligent rules and real-time analytics of open physician schedules to enable patient self-scheduling based on questions and information gathered to offer appropriate appointments. In the near term, patient self-scheduling is a market differentiator. In the long term, it will be commonplace and a consumer expectation.

Business Impact

Providers offering patient self-scheduling benefit from better patient retention and significant reduction in their patient no-show rate with improved patient satisfaction. Real-time patient self-scheduling is synchronous and convenient. When integrated with a physician's schedule, it can make a broader impact on a patient's care journey with extended functionalities such as provider search, referral management and provider matching.

Drivers

- Patient self-scheduling is quickly becoming a consumer expectation and an integral part of digital strategy for consumer engagement and patient retention.
- Physicians now demand greater control over their scheduling preferences and greater control over their time as opposed to building a set schedule in their patient appointment systems and working with IT to modify it often.
- Similarly, due to changing work-life balance, patients now demand convenience and flexibility, reduced work absenteeism, and more immediate access to provider services for routine and less complex visits.
- The competitive threats from digital giants such as Amazon or retailers such as Walmart require providers to level up their patient engagement and patient experience. The self-scheduling capabilities help achieve higher facility and staff utilization, fewer no-shows, improved patient experience and retention, enhanced operational efficiency, and patient growth.
- Patient self-scheduling systems are evolving to include: patient eligibility and verification; out-of-pocket cost, care financing options; HSA and credit card payments; medical shopping based on quality, cost and geographic location; real-time and simplified billing, and bundled pricing.
- We also see strong interest in patient self-scheduling from our global clients that are using stand-alone patient self-scheduling solutions. The increasing use of online self-scheduling for telehealth sessions during the pandemic also helped fuel adoption and accelerated the time to maturity.

Obstacles

- The most commonly reported technical barriers are integration and standardization of self-scheduling across multiple EMRs, practice management solutions and telehealth platforms.
- Another barrier to adoption is cultural. Many physicians still have questions about this technology and its ability to control their calendar. They have concerns that the algorithms used to schedule patients will not be capable of matching the skill of staff who have a highly nuanced understanding of the physician's preferences.
- Advancement of digital first and telehealth due to the COVID-19 pandemic has accelerated the interest and adoption rate of self-scheduling, and has propelled this innovation to the Slope of Enlightenment. However, complete patient self-scheduling that is synchronous, convenient and seamlessly integrated in real time with provider patient management systems and care delivery systems is still evolving and yet to make its full impact on patient experience.

User Recommendations

- Refine your understanding of patient self-scheduling requirements and challenges. Mitigate project risk by piloting in a low-patient-volume care venue. Use pilot outcomes to determine how, when and where to expand the program.
- Track and measure patient self-scheduling's impact on customer satisfaction and other important KPIs, and use the results to decide whether to expand the program or not.
- Increase the likelihood of your success by assessing the IT, cultural and organizational readiness for patient self-scheduling.
- Compose the digital patient access experience by coupling self-scheduling capabilities (online, patient portal, website or text messaging, anytime, day or night) with extended patient access capabilities. These include touchless or zero-contact check-in, patient registration, appointment reminders and multichannel patient communication and outreach.

Sample Vendors

Clearwave; DocASAP; Experian Health; Healthgrades; Kyruus; MyHealthDirect; Radix Health; Relatient; Solutionreach; Zocdoc

Gartner Recommended Reading

[Create a Patient-Centric Revenue Cycle by Addressing 6 Critical RCM Shifts](#)

[Market Guide for Interactive Patient Care](#)

[Innovation Insight for Consumer Experiences in Healthcare and Life Sciences](#)

OpenNotes

Analysis By: Sharon Hakkennes, Mike Jones

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

OpenNotes is an initiative to give patients convenient access to their clinical notes stored within electronic health records (EHRs). This is accomplished through local healthcare delivery organization (HDO) initiatives, most commonly using a portal tethered to the EHR, or through regional and national initiatives to provide patient access to shared care records.

Why This Is Important

OpenNotes is a growing international movement, rather than a product. Founded in 2010, the effort is based at Beth Israel Deaconess Medical Center in Boston, Massachusetts, with collaborators around the U.S. and overseas. Shared notes document interactions patients have with doctors, nurses and other clinicians, and make up “the story” of a person’s healthcare. HDOs decide which type of notes they will open to patients, which roles are included and the scope of which departments participate.

Business Impact

OpenNotes supports improvements in healthcare delivery through greater information transparency. Many studies have now demonstrated the value of OpenNotes, including:

- Empowering individuals to become active participants in their own care.
- Enhancing patient understanding of their health and medical condition(s).

- Increased collaboration and trust between patients and clinicians.
- Improved adherence to treatment and care plans (e.g., medication management).
- Improved accuracy of clinical documentation.

Drivers

U.S. HDOs' 5 April 2021 compliance date with the 21st Century Cures Act's Interoperability, Information Blocking and the ONC Health IT Certification Program Final Rule is accelerating adoption of OpenNotes. Specifically:

- The rule is designed to advance interoperability; support the seamless exchange, access and use of electronic health information; and address information blocking.
- The rule applies to all clinical users across all clinical settings and specifies eight different types of notes that must be shared as defined in the [United States Core Data for Interoperability \(USCDI\)](#). These include consultation, progress and procedure notes.
- In October 2022, the restrictions limiting required information for sharing to the USCDI will be lifted — at which time patients will have the right to access all of their electronic health information.

The movement has also attracted a lot of interest in other regions across the globe where government-led regulations and initiatives are driving adoption. For example:

- In the U.K., general practitioners (GPs) are committed to providing patients with online access to their full record, including the ability to contribute their own information from April 2020. Patients can access their records through the national NHS App or through a number of commercially available solutions.
- In Estonia, the eHealth Record is a nationwide system integrating data from Estonia's different healthcare providers to create a common record that every patient can access online. Patients access their records through an e-Patient Portal, and blockchain technology is being used to assure the integrity of retrieved records as well as system access logs.
- Across Canada, adoption of OpenNotes is occurring at both the HDO level (for example, [University Health Network myUHN](#)) and the provincial level (for example, [Alberta Health Services Connect Care](#)).

Obstacles

- Clinician resistance due to the perception that workloads will increase as a result of additional time required to write each note or increased communication from patients reading the notes.
- Clinical concerns that access to electronic health information may create undue patient anxiety due to misinterpretation of information or through access to distressing information — such as real-time patient access to laboratory and imaging test results.
- Lack of access to medical record information in an electronic format limits the adoption of OpenNotes for HDOs outside of the U.S., where universal adoption of EHRs has not yet been achieved.
- Variable maturity of EHR systems in enabling OpenNotes initiatives, particularly in relation to providing controls required to restrict sharing for legitimate reasons such as concerns over privacy or potential harm.

User Recommendations

As a CIO planning OpenNotes initiatives, you should:

- Position OpenNotes as a strategic priority by ensuring that transparency in data sharing is a core component of your organization's consumer engagement strategy.
- Enable seamless patient access to their electronic health information by partnering with your EHR and patient portal vendor(s) to map current capabilities against your organization's requirements and agree on a development roadmap for identified gaps.
- Address clinical concerns and minimize risk of adverse impacts to patients by developing policies and processes to exempt patients from online access to parts of their records in circumstances where access would be detrimental to the individual.
- Maximize patient value derived through OpenNotes by establishing systems and processes to support patients in their access to and use of their electronic health information.

Sample Vendors

Allscripts; Apple; Cerner; CommonHealth; Epic; InterSystems; MEDITECH; Patients Know Best

Gartner Recommended Reading

[Healthcare Industry Hot Topic: Debating the U.S. ONC Interoperability and Information-Blocking Rule](#)

[Healthcare CIOs: Prepare for Granular Patient Consent](#)

[Healthcare Innovation Trends: Bridging Consumers' Engagement Gap With Their Health](#)

[Best-Practice Exemplar: Andalucía Health System Builds a Citizen-Centered Digital Care Ecosystem](#)

Healthcare Interoperability

Analysis By: Barry Runyon

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Interoperability refers to sharing, exchanging and effectively using electronic health information (EHI) to manage, deliver and coordinate care. In the context of this profile, interoperability includes the adoption and advances in healthcare interoperability rules, standards, frameworks, platforms and initiatives. Rather than plotting adoption and progress individually, we express the adoption and maturity of interoperability in aggregate, and its effect on the healthcare industry.

Why This Is Important

Interoperability makes it possible for organizations and disparate IT systems to share EHI in a standardized manner to facilitate patient access, care delivery and care coordination. Interoperability enables clinicians to safely access a patient's medical history regardless of where it resides. Hospitals can also share a patient's encounter activity and test results with community clinicians as they become available to optimize patient care outcomes and contain costs.

Business Impact

Recent interoperability policies have set the stage for:

- Convenient, safe access to EHI
- Standardization through open APIs, trust frameworks and expanded United States Core Data for Interoperability (USCDI)
- Increased payer/provider collaboration
- Mitigating information-blocking practices
- England's chief clinical information officer for health and care outlining [seven priority interoperability areas](#)
- The [recognition in Australia](#) that healthcare information systems do not interoperate

Drivers

- Value-based care approaches global adoption to improve the quality of care and contain the cost of care.
- There is a need to increase access to care, enhance care collaboration and improve care coordination.
- There is a need to improve semantic interoperability such as the uniform and pervasive adoption of clinical terminology standards worldwide.
- The 21st Century Cures Act, signed into law in December 2016, defined interoperability and prohibited information blocking.
- The ONC Cures Act Final Rule promoted and incentivized the adoption of APIs and trust frameworks, expanded the set of core clinical data elements (the USCDI), created information blocking exceptions and interoperability certification requirements for relevant actors within the rule.
- The U.S. Centers for Medicare & Medicaid Services (CMS) issued a complementary rule that required government health plans as well as health plans offered through the Affordable Care Act to provide patients increased access to their HIPAA EHI.
- The CMS rule improved access to and the quality of information that citizens need to make informed healthcare decisions, including data about healthcare prices and outcomes while minimizing reporting burdens on affected plans, healthcare providers or payers.
- The ONC and CMS rules have brought interoperability to the fore in the industry and have set the stage for more effective and meaningful patient and member access to EHI and health information exchange.
- The HL7 Da Vinci and Gravity projects will further these goals. The goal of the Da Vinci Project is to help payers and providers to positively impact clinical, quality, cost and care management outcomes.
- The Gravity Project defines Social Determinants of Health (SDOH) information so it can be documented in and exchanged across disparate digital health and human services platforms.

Obstacles

- The complexity of interoperability is considerable. It includes a plethora of wire protocols, data exchange standards, trust frameworks, information models and domain vocabularies.
- It involves standard development organizations, clinical vendors, interoperability platforms and networks and industry alliances such as CommonWell Health Alliance, and Carequality.
- The inherent complexity of interoperability is often exacerbated by overoptimistic vendor claims and unrealistic user expectations.
- Interoperability includes semantic interoperability or the exchange of clinical information with enough meaning and granularity to support clinical decision support, care management, clinical research, quality assessment and business intelligence. Meaningful semantic interoperability depends largely on data quality and relevant enrichment and remains an industry challenge.

User Recommendations

- Evaluate interface/integration platform plans to support more robust interoperability requirements and industry timelines.
- Participate in regional health information exchange networks that take advantage of existing interoperability standards, trust frameworks and industry alliances.
- Promote HL7 Fast Healthcare Interoperability Resources (FHIR) and SMART on FHIR capabilities of your electronic health record (EHR) vendor (API technology supplier) necessary to support consumer and third-party EHI access.
- Report suspected information blocking by referring to the guidelines set forth within the ONC rule. Legitimate information-blocking exceptions should be taken into consideration.
- Strengthen patient engagement by preparing for consumer-mediated health information exchange. Investigate notable industry alliances and advocacy groups such as the [CARIN Alliance](#) and government initiatives such as [MyHealthEData](#) and Australia's [Personally Controlled Electronic Health Record \(PCEHR\)](#).

Sample Vendors

Carequality; CARIN Alliance; CommonWell Health Alliance; Health Level Seven International; Integrating the Healthcare Enterprise; Surescripts

Gartner Recommended Reading

[Healthcare Provider CIOs: Prepare for the Consumer-Mediated Health Information Exchange](#)

[Establish Interoperable Application Ecosystems Early in Your Composable Healthcare Provider Roadmap](#)

[Prepare for ONC Information-Blocking Exceptions](#)

Entering the Plateau

Computer-Assisted Coding

Analysis By: Sachin Dev

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Mature mainstream

Definition:

Computer-assisted coding (CAC) is an application or service combining natural language processing (NLP) with machine learning (ML) to provide or suggest diagnosis and treatment codes to medical coders based on reading and interpretation of clinical documentation. CAC augments and validates coding and enables straight-to-bill coding for targeted services.

Why This Is Important

CAC's ability to ingest clinical documentation and suggest medical codes required for billing augments medical coders' efforts to abstract, code and validate documentation. More efficient and accurate coding leads to faster claims processing and, in turn, revenue improvement. CAC also mitigates the risk of increased coding errors and compliance risk that often occur due to complex coding requirements and coders' unfamiliarity with new codes and guidelines released each year.

Business Impact

CAC applies medical coding rules and algorithms to eliminate the need for coders to access multiple systems and accurately generate medical codes directly from the clinical documentation. Medical coders use CAC to scan through large volumes of clinical documentation and link documentation to specific medical codes for easy validation. This improves coder productivity, accuracy and coding integrity, ultimately leading to revenue optimization and faster cash flow.

Drivers

- Business leaders demand CAC applications to help solve a broad range of problems that present financial, operational and regulatory risks to HDOs, including: (1) the fast-growing volume and complexity of medical data, including large amounts of unstructured data; (2) limited availability of — and intense competition for — personnel with the necessary coding skills and certifications; (3) poor coding productivity, resulting in long cycle times and excessive costs; (4) documentation that's incomplete, inaccurate or inconsistent, resulting in manual rework, increased operational costs, lost revenue, and poor clinician and patient experiences; (5) ineffective querying processes for clinical documentation improvement; and (6) the growing number of payers' audits to recoup money (for example, from the Medicare Recovery Audit Contractor program).
- Enhanced NLP and ML in today's CAC applications can ingest and mine data — structured and unstructured — across a vast array of patient records. CAC can, therefore, expand direct-to-bill capabilities with client-defined thresholds by validating and auditing codes to ensure that coding requirements are met. Value is extended still further when CAC is integrated with computer-assisted clinical documentation improvement (CACDI) and real-time physician documentation improvement (RTPDI) tools.
- In 2021, CAC has become a mainstream technology delivering operational efficiency, accuracy and regulatory compliance in medical coding. CAC, originally intended to augment medical coders, is also now evolving to “autonomous coding” that uses clinical language understanding (CLU) and AI to autonomously medically code the charts without input from medical coders. The new pilots and implementation of autonomous coding are already underway, with HDO business leaders still awaiting specific regulatory guidance on this technology.

Obstacles

- CAC solutions vary considerably in features, functionality and total cost of ownership (TCO), as well as their integration capabilities with EHR and revenue cycle management (RCM) systems. HDO IT and business decision makers still see TCO as high when compared to other RCM technologies.
- Multiple data interfaces are needed for CAC implementation to receive and send the clinical documentation into the medical coding software (encoders) and to receive the coded data. Lack of strategic guidance on integration of CAC applications with HDOs' current medical coding systems (also known as encoders), EMR and revenue cycle systems creates a challenge in identifying the right vendor partner.

- CAC is now a mature technology, but it still requires significant implementation commitment and engagement from HDOs and their already overburdened medical coding and clinical staff.

User Recommendations

- Calculate and publicize the strategic value of CAC — such as return on investment (ROI), workflow efficiency and cost improvements.
- Conduct a value analysis of CAC solutions for your organization to understand the net (ROI) by comparing the results of your coding compliance assessment with national averages and benchmarkings.
- Evaluate CAC applications and their underlying technologies (ML and NLP) by targeting coding accuracy toward “exact code” and direct-to-bill capabilities.
- Identify the most appropriate CAC vendors and their medical coding solution offerings by aligning vendor capabilities with your organizational requirements. CAC solutions vary in TCO, features and functionality, as well as their integration capabilities with EHR and revenue cycle management (RCM) systems.
- Combine CAC with CACDI and RTPDI to create an integrated coding and documentation improvement program.

Sample Vendors

3M-M*Modal; Artificial Medical Intelligence; Dolbey; EZDI; nThrive; Nuance; Optum; Platocode

Gartner Recommended Reading

[The Healthcare Delivery Organization CIOs’ Guide to Computer-Assisted Coding](#)

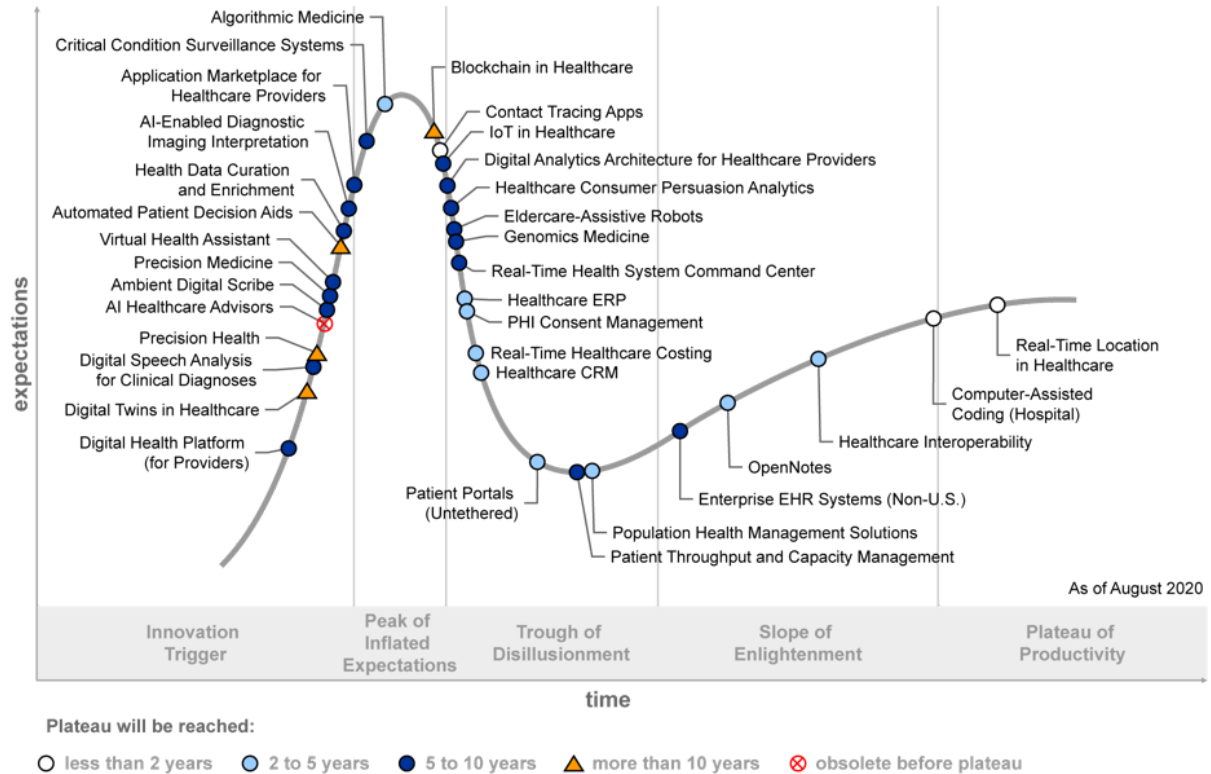
[Create a Patient-Centric Revenue Cycle by Addressing 6 Critical RCM Shifts](#)

[Healthcare Delivery Organization CIOs Must Accelerate Revenue Cycle Optimization to Meet Financial Goals](#)

Appendixes

Figure 2: Hype Cycle for Healthcare Providers, 2020

Hype Cycle for Healthcare Providers, 2020



Source: Gartner
ID: 448168

Gartner

Hype Cycle Phases, Benefit Ratings and Maturity Levels

Table 2: Hype Cycle Phases

(Enlarged table in Appendix)

Phase ↓	Definition ↓
<i>Innovation Trigger</i>	A breakthrough, public demonstration, product launch or other event generates significant media and industry interest.
<i>Peak of Inflated Expectations</i>	During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the innovation is pushed to its limits. The only enterprises making money are conference organizers and content publishers.
<i>Trough of Disillusionment</i>	Because the innovation does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.
<i>Slope of Enlightenment</i>	Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the innovation's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.
<i>Plateau of Productivity</i>	The real-world benefits of the innovation are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase.
<i>Years to Mainstream Adoption</i>	The time required for the innovation to reach the Plateau of Productivity.

Source: Gartner (July 2021)

Table 3: Benefit Ratings

<i>Benefit Rating</i> ↓	<i>Definition</i> ↓
<i>Transformational</i>	Enables new ways of doing business across industries that will result in major shifts in industry dynamics
<i>High</i>	Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise
<i>Moderate</i>	Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise
<i>Low</i>	Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings

Source: Gartner (July 2021)

Table 4: Maturity Levels

(Enlarged table in Appendix)

<i>Maturity Levels</i> ↓	<i>Status</i> ↓	<i>Products/Vendors</i> ↓
<i>Embryonic</i>	In labs	None
<i>Emerging</i>	Commercialization by vendors Pilots and deployments by industry leaders	First generation High price Much customization
<i>Adolescent</i>	Maturing technology capabilities and process understanding Uptake beyond early adopters	Second generation Less customization
<i>Early mainstream</i>	Proven technology Vendors, technology and adoption rapidly evolving	Third generation More out-of-box methodologies
<i>Mature mainstream</i>	Robust technology Not much evolution in vendors or technology	Several dominant vendors
<i>Legacy</i>	Not appropriate for new developments Cost of migration constrains replacement	Maintenance revenue focus
<i>Obsolete</i>	Rarely used	Used/resale market only

Source: Gartner (July 2021)

Document Revision History

[Hype Cycle for Healthcare Providers, 2020 - 5 August 2020](#)

[Hype Cycle for Healthcare Providers, 2019 - 29 July 2019](#)

[Hype Cycle for Healthcare Providers, 2018 - 18 July 2018](#)

[Hype Cycle for Healthcare Providers, 2017 - 14 July 2017](#)

[Hype Cycle for Healthcare Providers, 2016 - 14 July 2016](#)

[Hype Cycle for Healthcare Provider Applications, Analytics and Systems, 2015 - 20 July 2015](#)

[Hype Cycle for Healthcare Provider Applications, Analytics and Systems, 2014 - 25 July 2014](#)

[Hype Cycle for Healthcare Provider Applications, Analytics and Systems, 2013 - 31 July 2013](#)

[Hype Cycle for Healthcare Provider Applications and Systems, 2012 - 31 July 2012](#)

[Hype Cycle for Healthcare Provider Applications and Systems, 2011 - 2 August 2011](#)

[Hype Cycle for Healthcare Provider Applications and Systems, 2010 - 27 July 2010](#)

[Hype Cycle for Healthcare Provider Applications and Systems, 2009 - 23 July 2009](#)

[Hype Cycle for Healthcare Provider Applications and Systems, 2008 - 27 June 2008](#)

[Hype Cycle for Healthcare Provider Applications and Systems, 2007 - 11 July 2007](#)

[Hype Cycle for Healthcare Provider Applications and Systems, 2006 - 3 July 2006](#)

Recommended by the Authors

Some documents may not be available as part of your current Gartner subscription.

[Understanding Gartner's Hype Cycles](#)

[Create Your Own Hype Cycle With Gartner's Hype Cycle Builder](#)

[Healthcare and Life Science Digital Optimization and Modernization Primer for 2021](#)

[Creating the Composable Healthcare Organization for Healthcare and Life Science CIOs](#)

[Healthcare Provider Top Actions for 2021: Prioritize Virtual Care and Care Team Collaboration](#)

[Healthcare Provider CIO Top Actions for 2021: EHR Optimization](#)

[Tool: Healthcare Provider CIO Executive Presentation for a Composable Digital Health Initiative](#)

[Create a Patient-Centric Revenue Cycle by Addressing 6 Critical RCM Shifts](#)

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Table 1: Priority Matrix for Healthcare Providers, 2021

Benefit ↓	Years to Mainstream Adoption			
	Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
Transformational		Algorithmic Medicine IoT in Healthcare Real-Time Health System Command Center	Digital Health Platform Genomics Medicine Precision Health Precision Medicine	Blockchain in Healthcare Digital Twins in Healthcare
High	Computer-Assisted Coding	Healthcare Application Marketplace Healthcare CRM Healthcare Interoperability Patient Portals (Untethered) Patient Self-Scheduling Population Health Management Solutions	AI-Enabled Diagnostic Imaging Interpretation Ambient Digital Scribe Critical Condition Surveillance Systems Digital Analytics Architecture Digital Clinical Voice Analysis Enterprise EHR Systems (Non-U.S.) Healthcare Consumer Persuasion Analytics Health Data Curation and Enrichment PTCM	

Benefit ↓	Years to Mainstream Adoption			
	Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
Moderate	Contact Tracing Apps	OpenNotes PHI Consent Management Real-Time Physician Documentation Improvement	Assistive Healthcare Robots	Automated Patient Decision Aids
Low				

Source: Gartner (July 2021)

Table 2: Hype Cycle Phases

Phase ↓	Definition ↓
<i>Innovation Trigger</i>	A breakthrough, public demonstration, product launch or other event generates significant media and industry interest.
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<i>Years to Mainstream Adoption</i>	The time required for the innovation to reach the Plateau of Productivity.

Phase ↓

Definition ↓

Source: Gartner (July 2021)

Table 3: Benefit Ratings

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