Insights Series

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How are innovators driving digital transformation in healthcare?

A thought leadership paper on "Transforming the system of care" and "Achieving operational excellence" co-authored with ECG Management Consultants

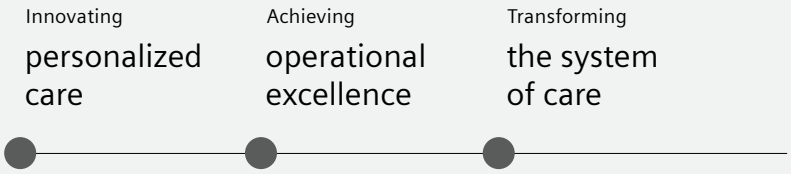
SIEMENS Healthineers

Preface

The Insights Series

The Siemens Healthineers **Insights Series** is our preeminent thought leadership platform, drawing on the knowledge and experience of some of the world's most respected healthcare leaders and innovators. The Series explores emerging issues and provides you with practical solutions to today's most pressing healthcare challenges.

At Siemens Healthineers, we pioneer breakthroughs in healthcare. For everyone. Everywhere. By constantly bringing breakthrough innovations to market, we enable healthcare professionals in:



Our **Insights** portfolio is an integrated collection of events, speaking engagements, roundtable discussions, and an expanding array of print and digital platforms and products all carefully curated to share ideas, encourage discussion, disseminate original research and reinforce our position as a healthcare thought leader.

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Executive summary

How are innovators driving digital transformation in healthcare?

Healthcare has been changing rapidly for many years, but the COVID-19 pandemic has accelerated the rate of change like never before. In addition to helping drive the shift to value-based care, COVID-19 pandemic has intensified the consumer-like expectations that many patients now have of the healthcare systems. Patients expect to access care where they live, work, and play – and they want that access to be seamless and quick.

While healthcare organizations around the globe are making progress in meeting these expectations, they still have a long way to go. Health systems that aspire to be patient- or consumer-centric must find more and better ways to remove friction and create simplicity for patients at every step of their journey.

Digitalization is one of the key tools for delivering more simplicity and convenience in healthcare. As is the case for other organizations in other industries, hospitals are looking to digital transformation as a core component of a strategy to achieve financial goals by better meeting customer needs. But the expectations of customers, in this case patients, are evolving and changing. Tracking, analyzing and meeting those expectations will require what we are calling digital maturity, and the goal of this paper is to provide hospitals and other healthcare organizations with the tools they need to acquire that maturity.

Studies have shown that organizations with higher digital maturity are almost three times more likely to see above-average annual revenue growth and net profit margins than lower-maturity organizations.[1] With that in mind, ECG Management Consultants, a leading U.S.-based healthcare consulting company, designed a Healthcare Digital Maturity framework to specifically help healthcare organizations assess how digitally mature they are today, in order to discover opportunities for growth tomorrow.

The ECG digital maturity framework covers the following four strategically critical areas:

1. Organizational data capabilities
2. Optimized internal business operations
3. Seamless patient care experience
4. Personalized medicine

In each section of this paper, there is a checklist for self-assessment, as well as a real-life example of how a state-of-the-art innovator uses technologies to improve its operations, and what is required for others to reach that stage of maturity.

The challenge

Digital transformation requires an enterprise-wide, holistic mindset.

The COVID-19 pandemic has brought about significant changes to healthcare the world over, not the least of which is the clear impact it has had on how patients view and interact with their care providers. Patient experience and patient satisfaction must now be top of mind with healthcare leaders, because it is increasingly top of mind with healthcare consumers.

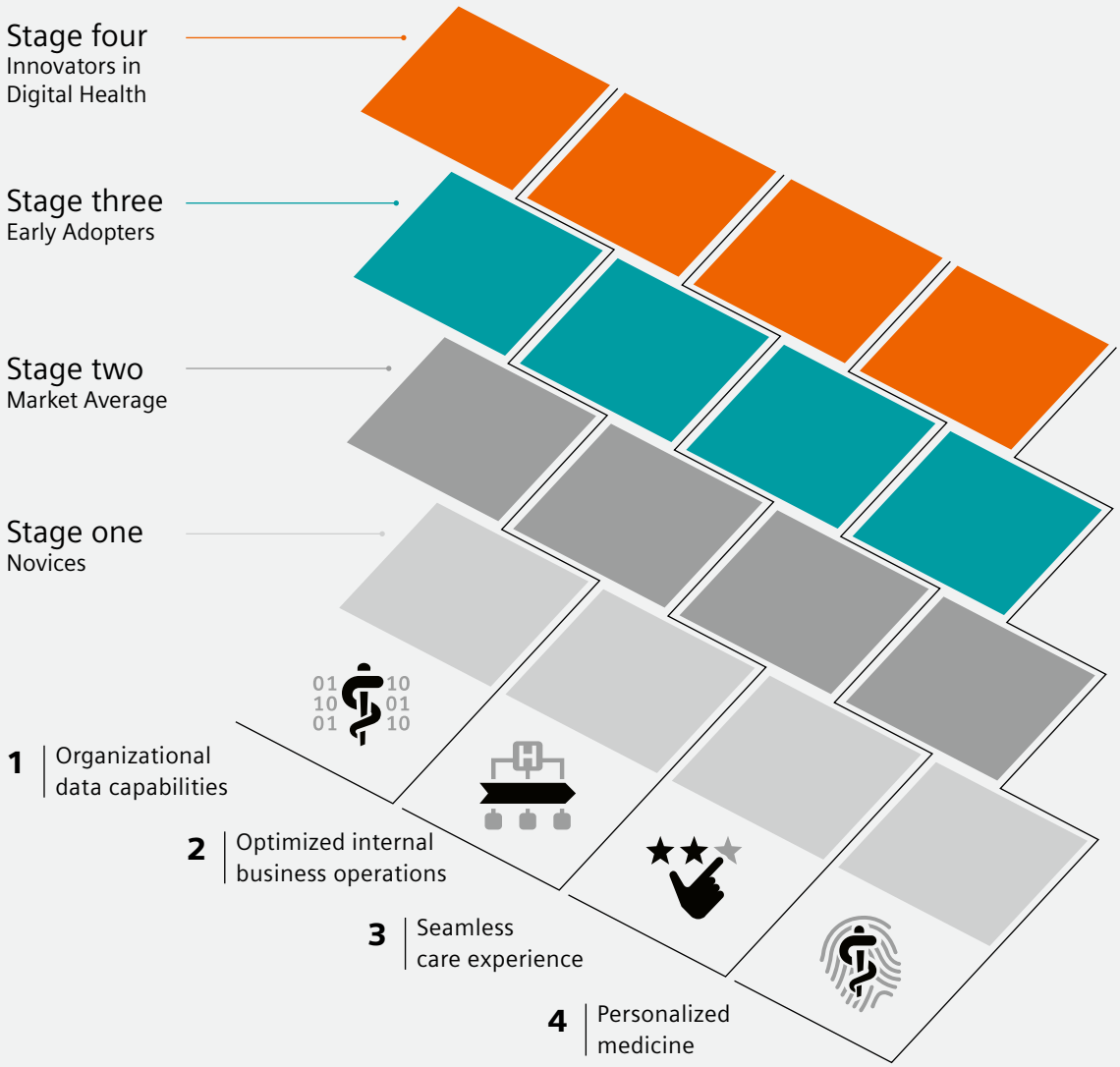
Indeed, "consumer" is a good description for how patients see themselves, and how they behave. Health organizations looking for ways of attracting and retaining these consumers are turning to digital technology, in the hopes that it can help them identify and meet patient priorities. New digital health technologies are emerging rapidly and investments in digital health companies continue to smash records.[2] According to a survey by the American Hospital Association, about 85% of hospital executives say digital innovation is part of their long-term strategy. But which particular technology is right for each organization?

Furthermore, technology alone will not drive true change. The successful deployment of a digital initiative requires more than just technology enablers – operational enablers are also critical to success for innovators. In addition, forward-thinking organizations understand that digital transformation needs an enterprise-wide mindset, not a series of siloed projects. There need to be clear targets and strategic goals, coupled with comprehensive understanding of relevant operations and linked processes, in order to determine which technology would bring the greatest value. Measuring digital maturity helps organizations locate themselves in a complex digital landscape, and is a first step for bringing sustainable changes to the health system.

ECG has completed more than 12,900 consulting projects of different types for more than 2,500 leading healthcare organizations in the U.S. For digital transformation projects, ECG identified four key strategic focused areas: organizational data capabilities, optimized internal business operations, seamless care experience, and personalized medicine. Based on that, they have developed a framework that measures the digital maturity of a hospital in a holistic way. In addition to discussing the technology enablers in each of the focus area, the operational enablers are also discussed for innovators or those who lack those operational components. This framework allows healthcare organizations to discover opportunities, set benchmarks, and design a roadmap for future maturity growth tomorrow.

Healthcare digital maturity framework

Where is your organization in the four strategically critical areas of digital transformation?



For a first analysis of your own organization, use our questionnaire after each chapter.

The solution

1. Organizational data capabilities

You cannot be patient-centric without understanding your patients. Who are they? What are their habits? What procedures have they had in the past?

The insights gained from healthcare data can paint a holistic picture of patient health history and directly impact outcomes. Data capability in healthcare is the ability to acquire, store, process and analyze large amounts of health data in various forms, and deliver meaningful information to users in a timely fashion.[4] While almost all doctors agree that easier access to critical data can save lives, the data capability of healthcare organizations can vary widely.

Organizations with limited data capabilities struggle to make sense of the immense amount of data flooding in every day. This can be caused by a data environment that is siloed and lacking data governance structure. Inefficiencies such as duplicate testing are the result of disparate data sets, which can restrict the ability of doctors to get a detailed view of their patients' care across the continuum. In addition, the operational and business insights drawn from such data environments are outdated.

Innovators in digital health maximize their data capabilities by consolidating data storage through data warehouses or data lakes in order to augment clinician and staff performance. Innovators are noted for their use of advanced analytics and Artificial Intelligence (AI) such as natural language processing and machine learning, so that they can build patient Customer Relationship Management (CRM) systems and employ population health analysis to deliver a more personalized experience for patients. In addition, operational enablers such as having a data governance and data strategy plan in place are critical success factors.

Johns Hopkins Medicine*, an innovator in digital health, built its population health analytics toolkit called the ACG® System for better clinical, operational, and financial management. On the patient side, it not only generates a comprehensive view of a patient's care journey using various sources of data, it also predicts which patients may need targeted care management, are at risk of future hospitalization, or have chronic conditions that may need proactive care. On a macro level, the system has the ability to identify population risk factors and forecast population healthcare utilization. Operationally, it provides performance analysis and predicts patients' resource use to anticipate staffing and resource needs based on population risk factors.

96%

Physicians agree that easier access to critical data can save lives.[3]

*Cases are not attributable to ECG.

Healthcare digital maturity framework

Which level describes your organization?

Organizational data capabilities

Stage one
Novices

- Data migration from an operating system to a central repository is limited
- The operational, tactical, and business information and analytics that end-users have access to is limited and represents historical performance
- Data insights regarding operational revenue and costs are outdated or insufficient

Stage two
Market average

- There is a singular, consolidated data storage location such as a data warehouse or data lake
- Information and analytics are real time or near real time
- Has a detailed view into patient's total cost of care across multiple care settings throughout the continuum, including episodic and case-specific detail
- Actionable data analytics is used to identify clinical and operational improvement opportunities
- Drill-down capabilities are available to view specific information for patient and populations

Stage three
Early adopters

- Advanced data analytic capabilities provide insight to support patient care (e.g., patient capacity planning, clinical interventions)
- Automated augmentation points are available for clinical teams (e.g., sepsis alerts, clinical trial matching)
- Advanced augmentation points are available for nonclinical teams (e.g., coding and claims denial)
- Advanced analytic capabilities are available to reduce time spent on pre- and postcare activities

Stage four
Innovators

- The organization has AI capabilities (e.g., natural language processing, machine learning, advanced statistical analysis) to augment clinician and staff performance and deliver a more personalized patient care experience

The checklists are designed by ECG Management Consultants to help you assess the current status of your digital transformation in each specific area. With this self-assessment, you can benchmark against innovators, identify gaps, and determine the next step needed to achieve your strategic goals.

2. Optimized internal business operations

While not all internal business operations directly impact patient satisfaction, optimizing certain processes can help patients navigate the care experience and help providers track revenue easily. The journey starts with patients scheduling their initial appointments and ends when providers get paid fully for the services provided.

To evaluate the efficiency of this process, every step must be examined: from how patients find the right in-network provider, schedule appointments and register, to financial clearance, check-in, coding and charge capture, billing and collections, and finally, patient follow-up.

Registration and appointment scheduling

According to a survey of more than 200 North American consumers who have booked a service appointment in the past year, nearly 70% of respondents say that they would choose to book services online, with the ability to schedule medical appointments online being the most desirable.[5] Online scheduling offers 24-hour availability and can undoubtedly lead to higher patient volume and revenue. Internally, online scheduling makes it easier to fill empty appointment slots and reduces the administrative burden on staff.

Novices in digital health do not offer seamless online provider search and booking and consequently risk losing potential new patients. Patients have to schedule appointments by phone, sometimes with a long wait time, without knowing in advance what times are actually available. Even when providing online booking options, Novices have not optimized provider schedules to allow for timely availability. Once the patients arrive on site, they are greeted with a stack of paperwork for registration, and may even have to fill out the same information multiple times. Manual transcription of this data by staff to electronic health records (EHRs) wastes time and is error prone.

Innovators in digital health not only offer patients the option of scheduling appointments online, but also via phone, text, and chatbots. Searching for a provider who is in-network is easy and returns accurate results. Patients can register electronically before the visit, and the software's context-awareness allows registration to be specific to patient demographics and health condition. These health organizations also use different automated methods to reach out to patients for referral processing based on their preferences, such as using automated dialers, text messaging, or portal messages. Operationally, having an efficient staffing model, standardized appointments, rules and templates are important enablers as well.

Ascension*, a Missouri-based health system that operates in 21 states, leads the pack in creating a seamless end-to-end consumer experience for its patients. Besides having a mobile-friendly website, it also offers a Click-to-Schedule service, which allows patients to see appointment availability and schedule online easily.[6] This simple scheduling process is important not only for retaining current patients, but for attracting new patients. Since the rollout, Ascension has seen a 779% increase in primary care online visits scheduled, and approximately 100,000 additional visits over the previous year.[7]

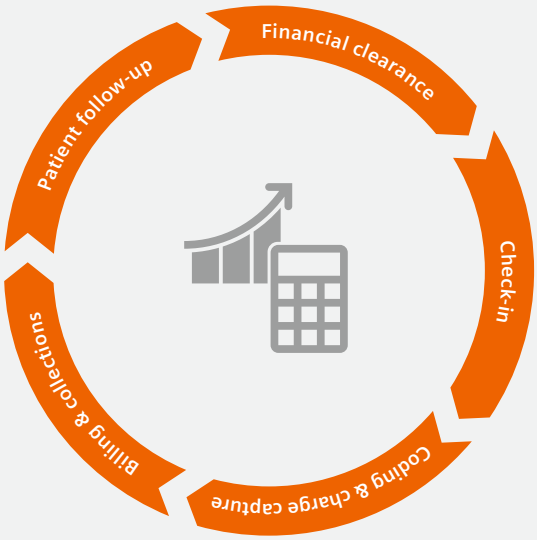
**Cases are not attributable to ECG.*

Financial clearance

Through its patient survey, Cleveland Clinic Health System learned that patients could lose some of their trust in the institution while simply navigating the billing experience. The survey showed that one of the reasons why patients sometimes fail to pay their medical bills is confusion and skepticism about accuracy.[7] According to another report, as many as 80% of consumers have been surprised by a medical bill[8], causing them to lose trust in the hospital and look to a competitor for future services. The Centers for Medicare & Medicaid Services (CMS) created a new rule that aims to radically change price transparency standards in healthcare and enable consumers to shop around for care.[9] While cost estimation is only a fraction of RCM digitalization, health systems with a consumer-friendly solution to price transparency will likely have a competitive advantage.

One of the ways to increase transparency is to make cost estimates available online, but novices in digital health do not offer this possibility. Patients have no easy access to alternate coverage or charity care qualification. Patient benefits are only manually verified through payer websites, which can potentially cause patients to be dismayed by the final bill.

Innovators tap into digital technologies to avoid patient surprises. First, they make all cost or self-pay estimates available electronically, and they automatically roll any additional liabilities into existing payment arrangements. Innovators can also create a tailored strategy to communicate billing options to patients, thanks to their context awareness ability and patient propensity insights, allowing them to proactively offer different payment plan options even before treatment begins. Cleveland Clinic* makes its prices transparent by publishing patient price lists and provides cost estimates for their services online so that patients can easily access cost



Revenue cycle workflows

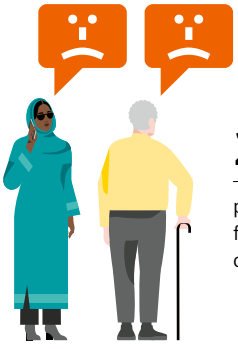
have been organized into 5 categories of work and are dependent on the geographic location of the respective healthcare provider. The following content is mainly applicable for U.S. health systems.

*Cases are not attributable to ECG.

information.[10] It also offers patients different payment options, such as zero interest payment, financial assistance, or financial advocacy.

Check-in

Hospitals with better patient-reported experience perform better financially.[12] Check-in is the patient's first face-to-face contact with the facility. The check-in experience can influence a patient's perception of how smooth or hectic the rest of the visit will be. It also impacts the provider's financial cycle. By correctly capturing patient information during check-in, including insurance and coverage information, staff can identify co-pays and deductibles ahead of time so they can collect payment at the time of service.



2 out of 5

patients are already frustrated before their check-up even begins.[11]

Novices in digital health are characterized by manual and paper-based check-in processes, long delays and patient wait times. Patients arrive in a check-in area that is noisy and hectic. They have to fill out paper forms, and staff must scan insurance cards and informed consent forms into the EHR, while trying to enter data into the right fields. The lack of clarity around a particular patient's reason for visiting also puts time-of-service collections out of the question.

When walking through the door of an innovator in digital health, patients check in automatically through geofencing. If they need to complete or sign any forms, they can do so through a mobile app, and pay any time-of-service charges through apps with touchless options. Data entered by patients is automatically placed in the appropriate fields in the EHR. This frees up staff from repetitive data entry, and takes away the need for sharing clipboards, pens, or any surfaces, reducing the risk of infection. Operationally, innovators have an optimized staffing model with service standards in place, and provide regular training for staff.

Innovators like Intermountain Healthcare* reinvented their formerly cumbersome, paper-based check-in process, creating a convenient, automated, digital one. Digital assistants continually scan the EHR for upcoming patient appointments, and send each patient digital registration and intake questionnaires via text or email two days prior to his or her visit.[13] Using AI, these questionnaires are personalized according to patient medical history and visit type. As part of the digital check-in process, patients can upload their insurance card via photograph with their smartphone and e-sign informed consent documents, allowing them to complete their entire check-in process before ever stepping into the clinic.[13] After the upgrade of its check-in process, Intermountain saw a decrease of 25% in check-in time and earned a 96% patient satisfaction rating.[13]

*Cases are not attributable to ECG.

Coding and charge capture

Charge capture is the process whereby doctors record information about the services they have delivered, so they are then able to obtain reimbursement. Yet the complex nature of documenting how a physician addresses a patient's intricate symptoms, and then turning that information into codes for reimbursement, is complex and prone to error. Research shows that health systems can lose millions of dollars in revenues from charge leakage.[14] One survey found that 78% of healthcare leaders characterize charge capture as "essential" to their organization's success.[15] This is not surprising given that hospitals survive on razor-thin margins.

In healthcare organizations that are novices in digital health, note cards, post-its or even napkins sometimes end up being part of the charge capture process. Physicians enter information in the patient record manually, and coders then assign procedure and diagnosis codes manually before keying them into the patient accounting system without any oversight mechanism to ensure accurate coding.

Innovators in digital health are equipped with computer-assisted coding to accurately generate medical codes that are then electronically interfaced into patient accounting platforms. Using a combination of dictation and templated phrase completion for both routine care and surgical procedures, doctors can document patient cases and validate medical necessity in real time. Given the size, complexity, and varying levels of staffing across its 30 hospitals, Ardent Health* looks to digitalization and automation to improve documentation quality and optimize workforce. Its Computer-Assisted Physician Documentation runs queries as patients progress and makes sure doctors do not miss documenting important diagnoses.[16] By capturing more complete patient stories, Ardent Health has seen a reduction over just eight months in severity of illness and risk of mortality of 41% and 49% respectively.[16] Over the same period, they have captured an additional $2.7 million in reimbursement[16], and more importantly the new process frees up physicians' time to focus on patient care.

Billing and collections

More and more patients are opting for higher deductible and co-payment insurance plans, and are therefore responsible for an increasing portion of their healthcare costs. The resulting inability of patients to pay for the care they receive is now the top contributor to bad debt for hospitals and health systems.[18] The amount of bad debt expense reported in the U.S. reaches more than $55 billion annually.[19] Digital technologies such as analytics and pay predictive models of patient's propensity-to-pay could reduce the amount of bad patient debt.

Since claims are submitted manually and sometimes on paper, novices in digital health have to rely on manual reports to identify accounts that require follow-up. These reports allow only limited edits to ensure clean claims, making them more likely to be incomplete and thereby result in lost reimbursement revenue. They also tend to focus on denial resolution rather than prevention.

Innovators in digital health tap into the predictive power of AI for better decision-making. They can predict which claims may be denied, and also analyze remittance and denials to determine prevention strategies. Using predictive analytics, they can determine propensity-to-pay for every patient, and determine the most appropriate collection activities. In some institutions, there is even gamification during the process to stimulate staff engagement. On the other side, patients can strike up a conversation with an AI-supported chatbot to get their billing-related questions answered in real time.

**Cases are not attributable to ECG.*

What is the right strategy for innovators such as Alina Health*, who need to collect outstanding balances for 200,000 patients every month? The answer is targeted interventions with those patients who are more likely to pay their bills.[19] To do so, Alina Health uses 500,000 training cases to develop the propensity-to-pay machine learning model to predict the probability that patients will pay their bills. Using this predictive model, Alina Health divides its patients into four separate high to low propensity-to-pay segments, allowing the finance team to focus its collection efforts on patients who are more likely to pay and make the best use of its limited resources. Since using this propensity-to-pay algorithm and collection strategy, Alina Health has seen a $2 million increase in overall collections in just one year – a 43.2% relative improvement.[19]

Patient follow-up

The care experience does not end when the doctor's gloves come off. Patient statements are how healthcare organizations get paid, but as many as eight out of ten patients want more handholding from healthcare providers when it comes to understanding their financial obligation.[21] To be successful in patient follow-up, providers need to consider the diverse communication preferences of patients.

Novices in digital health send out statements to patients manually. They generate reports to see if there is a need to call certain patients for follow-up, but this process is manual. If patients have a question, calling by phone is the only way to reach the provider.

Omnichannel patient communication is the key to meeting the patient follow-up challenge. Innovators in digital health can meet various patient preferences by communicating through multiple approaches using phone, text, email, or chats. AI supports payment arrangement modeling and monitoring, and patients can access their clearly laid-out payment plans online. If patients have questions regarding their payment, AI-powered text or chatbots are there to respond anytime during the day.

UAB Medicine* used to have a very fragmented process within a single health system. Sensing the need to be more consumer-centric, UAB was looking for ways to remove friction in their patient care experience. UAB adopted an omnichannel platform that allowed patients to communicate online or by telephone to ensure that all patients would enjoy optimal experiences regardless of their communication preference.[22] In addition, the service extends to people with disabilities so that they can choose the method, frequency, and length of how they communicate.

47%

Hospitals in the U.S. saw increases in bad debt in 2020.[17]

*Cases are not attributable to ECG.

Which level describes your organization?

Optimized internal business operations

Registration and appointment scheduling

Stage one
Novices

- Appointments cannot be scheduled online
- Inbound (IB) and outbound (OB) communication is decentralized
- By default, patients have the onus to reach out to an organization to schedule their referral
- Patient registration is paper based; patients must repeat information multiple times
- Provider search and match is not available online

Stage two
Market average

- Online appointment scheduling is available through a portal, but options for scheduling are limited
- A limited level of IB and OB communication is centralized
- Phone outreach for referral processing is done manually
- Patient registration is electronic but often collected at the point of service; interoperability is varied
- Patients can search for a provider based on a limited number of filters

Stage three
Early adopters

- Online appointment scheduling is available through a portal, and options for scheduling are comprehensive
- The majority of IB and OB communication is centralized
- Phone outreach for referral processing is done through an automated dialer
- Patient registration can be collected electronically prior to a patient's visit (i.e., through a mobile app); interoperability is present
- Patients can search for a provider based on a broad set of filters

Stage four
Innovators

- Appointment scheduling is available through various methods (e.g., phone, online, text, chatbots) and options available are comprehensive
- There is a single centralized hub for IB and OB communication
- Outreach for referral processing is based on patient preferences and is automated and digital
- Patient registration is digital and specific to patient's demographics and condition (context awareness)
- The system can suggest the best provider for a patient to see based on the patient's demographics, financial profile, condition and health history

Which level describes your organization?

Financial clearance

Stage one
Novices

- Patient benefits verified manually through payer websites
- Alternate coverage is not identified for uninsured patients
- Authorizations secured through the phone or website
- Digital cost or self-pay estimates are unavailable
- Charity care qualification is evaluated manually

Stage two
Market average

- Patient benefits are verified using a real-time eligibility tool
- Alternate coverage is identified manually via payer websites
- Authorization management is facilitated via work driver; controls are in place to identify missing authorizations
- Electronic cost or self-pay estimates are available for a limited set of services
- Charity care process are facilitated via work driver

Stage three
Early adopters

- Rules-based batch benefits verification is in place
- Alternate coverage is identified electronically
- Authorization management is electronic (e.g., 278 file)
- Cost or self-pay estimates for most services are available electronically
- Automated charity care evaluation is in place
- Propensity-to-pay evaluation is used to establish previsit payment plans for self-pay patients

Stage four
Innovators

- Bots used for benefits verification
- Rules-based automated authorization management is in place
- Cost or self-pay estimates for all services are available electronically
- Context awareness and patient propensity is used to determine a tailored strategy to communicate billing

Check-In

Stage one
Novices

- Patient check-in process is manual and paper based
- Forms are completed on paper and scanned into the electronic health record (EHR)
- There are no time-of-service collections

Stage two
Market average

- Patient check-in is electronic through the EHR
- Forms are completed electronically with e-signature
- Time-of-service payments are collected and posted in real time in the patient account

Stage three
Early adopters

- Patient check-in can be completed through mobile app
- Forms can be completed and signed through mobile app
- Some payments are collected in advance of care event
- Credit card numbers are securely stored to facilitate time-of-service payments

Stage four
Innovators

- Patients are offered contactless check-in via geofencing
- Patients can pay time-of-service charges via apps supporting touchless options

Which level describes your organization?

Coding and charge capture

Stage one
Novices

- Clinicians manually document in the patient record
- Providers or coders manually assign procedure and diagnosis codes
- Charges are captured manually via paper and keyed into the patient accounting system
- No edits are in place to ensure accurate coding

Stage two
Market average

- Templates are in place to ensure optimal documentation
- Software is used to validate medical necessity
- Nonsurgical procedure codes are assigned by the provider; surgical procedure codes are abstracted by a coder; radiology procedural coding is assigned using computer-assisted coding software
- Nonsurgical charges are captured electronically; surgical charges are captured manually during abstraction by the coder
- Preclaim edits are in place to ensure coding accuracy
- Revenue integrity is validated manually

Stage three
Early adopters

- Medical necessity is validated using real-time edits based on payer guidelines
- Electronic controls are in place to notify requirements for ABNs and waivers
- Computer-assisted coding is used more broadly
- All charges are captured electronically and interfaced into patient accounting platform
- Revenue integrity and charge reconciliation are validated electronically

Stage four
Innovators

- Provider documentation is completed in real time using a combination dictation/templated phrase completion for all routine care and surgical procedures
- Some codes are abstracted using AI
- Preclaim edit resolution is recommended via AI or resolved using AI/robotic process automation (RPA)

Which level describes your organization?

Billing and collections

Stage one
Novices

- Claims are submitted manually and sometimes on paper
- Limited edits are in place to ensure clean claims
- Manual reports are used to identify accounts requiring follow-up
- Payments are primarily manually processed

Stage two
Market average

- Claims are "scrubbed" in bolt-on software or clearinghouse
- Claims are submitted through clearinghouse
- Secondary/cross-over billing is automatic
- Work drivers are in place to prioritize accounts for follow-up
- Automated claim status checks are in place
- RPA-supported payment posting in place for eligible payers
- Underpayment detection software is in place

Stage three
Early adopters

- Claim "scrubber" is integrated in the EHR
- There is direct claim submission for select payers
- Predictive analytics are used for payer representative availability
- Claim denial patterns are analyzed to determine prevention strategies
- RPA is used for simple denial resolution
- Underpayment detection and outreach is automated
- Paper remittance is converted to 835 files for posting
- Electronic remittance advice and electronic funds transfers are reconciled electronically

Stage four
Innovators

- AI is used to support edit resolution and denial processing
- Staff activity is gamified
- Select appeals are submitted automatically
- AI is used to analyze remittance and denials to determine prevention strategies

Patient follow-up

Stage one
Novices

- Statements are submitted manually
- Manual reports are generated to identify accounts for follow-up
- OB calls to patients are dialed manually
- IB calls are answered by whomever is available

Stage two
Market average

- Statements are submitted electronically
- Work drivers are in place
- Smart prioritization is in place (e.g., balance, propensity to pay)
- Advanced call management system is used to track performance (e.g., abandonment rate)
- Interactive Voice Response (IVR) is used to route calls and address common questions

Stage three
Early adopters

- There is omnichannel patient communication
- Automated dialer is used to contact patients
- Payment plans are set up online
- IVR is available to make payments
- Patients are provided care credit options
- Patients can live-chat with a customer service representative

Stage four
Innovators

- Staff activity is gamified
- AI is used to support payment arrangement modeling/ monitoring
- AI is used to support text/ chatbots

3. Seamless care experience

A survey done by Cleveland Clinic identified pain points that contributed to negative patient experience. These were: too little ease of use, lack of timely responsiveness, and lack of communication and empathy around these issues.[24] The key to addressing these pain points is creating a new way to communicate, and patient portals are the way to do that. Patients can request refills, schedule an appointment, and even access their own medical information whenever they want to. To deliver a seamless care experience, patient portals are essential.

Yet patients have very limited portal access when dealing with novices in digital health. The triage assistance for patients in these organizations is also very limited. The only option for seeing doctors is through in-person visits and patients must call the practice to obtain information. Given the limited hours of service, they frequently get unsatisfactory responses or no response at all to their questions and requests.

Innovators in digital health not only provide their patients with up-to-date information, but patients can upload information to their health record and share information with other organizations. Patients can communicate with providers through various access points such as phone, portal messaging, text, or chatbots, and they can use these same access points for on-demand triage that is available anytime. At the same time, providers and clinic staff can also send out proactive and personalized communication to patients. These organizations have the ability to augment virtual visits in real time with integrated remote capture technologies, a 360-degree view of a patient's needs, and preferences for both administrative and clinical functions. This is enabled operationally by standardized workflows, staff and patient training, as well as a team of technical support staff.

Leaders at Mayo Clinic* believe that successful practices of the future will infuse technology and innovation with a human touch. Patients at Mayo Clinic can connect to care teams through multiple channels, and they can view their health data from multiple health care providers in one place through Health Record on iPhone.[25] Mayo Clinic also launched an advanced care-at-home program, with doctors staffing a medical command center to care for people with a range of conditions such as cancer, heart failure, pneumonia, transfusions, and acute Covid-19 care, allowing patients to remain at home.[26]

50%

of healthcare consumers agree that a bad digital experience with a healthcare provider ruins the entire experience with that provider.[23]

Cases are not attributable to ECG.

Which level describes your organization?

Seamless care experience

Stage one
Novices

- There is limited portal access
- Patients must call the practice to obtain information; the process can be challenging
- Patient outreach is conducted as needed
- There is limited triage assistance for patients unsure of what setting to receive care in or how to treat symptoms present
- Only in-person visits are offered

Stage two
Market average

- Information contained on the portal is view-only and limited; information may not be up to date
- Patients can call the practice to obtain information with more ease
- Proactive communication strategies are siloed at the specialty/department level
- Nurse triage is provided through a phone service and may not be available 24/7
- Asynchronous video visits are offered through a separate application; interoperability with the EHR is limited

Stage three
Early adopters

- Patients have access to their entire medical record on their portal; information is up to date
- Patients can communicate with the practice through the patient portal in addition to phone
- Proactive communication strategies are population based and coordinated across the system
- Digital nurse triage is available through certain access points
- Asynchronous video visits and synchronous visits are integrated through the patient portal; integration with the EHR is functional
- Remote patient monitoring is available for certain populations

Stage four
Innovators

- Patients can upload or download information and share their record with other organizations
- Patients can communicate with providers through various access points (e.g., phone, portal messaging, text, chatbots)
- Providers and clinic staff send out proactive and personalized communication to patients
- On-demand triage is available 24/7 through various access points
- Virtual visits are augmented in real time by the integrated remote capture technologies
- Administrative and clinical functions have a 360-degree view of a patient's needs and preferences

4. Personalized medicine

The shift toward patient-centered healthcare has opened the door for individualized approaches to diagnostics and treatment. Personalized medicine aims to provide the right treatment at the right time for every patient, instead of a one-size-fits-all approach. It requires a precise understanding of the patient's condition, often through genomic testing, in order to offer tailored treatment without unwarranted variation.

Novices in digital health struggle with personalized care delivery and are characterized by encounter-based care. Patients are only treated for the presenting illness, and patient clinical alerts for follow-up and tracking do not exist. Population surveillance and data gathering are almost absent, making population health management difficult.

Innovators in digital health provide truly personalized whole-person care. Remote monitoring is in place so that data can be automatically captured to alert care teams about adverse events. Innovators use AI to proactively monitor patient data and provide alerts on outliers for clinical follow-up. Not only do they perform genomic screening on all patients to guide molecular-based treatments, but doctors also consider epigenetic factors in care decision making. Operationally, personalized care delivery is enabled by a population management strategy, genetic counselors to support patients, as well as training for patients and staff.

One innovator that committed to a whole-person approach to precision medicine is Johns Hopkins Medicine*. The organization set up a strategic initiative called inHealth to increase precision and customization of patient care.[28] Out of this initiative, the Precision Medicine Centers of Excellence (PMCOEs) were born to make it easier for clinicians to conduct big-data research and translate their insights into clinical applications.[29]

One success story from this initiative: investigators from prostate cancer PMCOEs have found that a genomic test can estimate patients' risk of metastasis, death from prostate cancer, and overall survival. Using results from this test, clinicians can better determine which patients with recurrent prostate cancer may benefit from hormone therapy,[30] which spares many patients from unnecessary side effects. Johns Hopkins has so far launched 16 PMCOEs, and it plans to expand to 50 centers over the next five years.

25–65%

of all healthcare costs are attributable to unwarranted variations.[27]

**Cases are not attributable to ECG.*

Which level describes your organization?

Personalized Medicine

Stage one
Novices

- Care delivery is encounter-based
- Treatment is provided for the presenting illness
- Population surveillance and data gathering is limited
- Patient clinical alerts for follow-up and tracking do not exist

Stage two
Market average

- Population-based programs exist for one or two chronic diseases but are basic
- Pharmacogenetic testing is available for one or two commonly used drugs
- Data gathering and tracking across the continuum of care is limited
- Few clinicians or specialties deploy data-driven diagnoses and customized treatments

Stage three
Early adopters

- Remote monitoring is available for specific populations, data is automatically captured, and the care team is alerted about adverse events
- Population health management is managed by dedicated staff
- Drug therapies are targeted based on molecular testing
- Pharmacogenetic screening is provided for multiple drug regimens
- Integrated best practices and predictive analytics are on hand for providers

Stage four
Innovators

- Molecular-based treatments are guided by patient genomic profile
- Genomic screening is performed on all patients
- Technology prompts staff and patients for follow-up directly
- There is increased attention to epigenetic factors in care decision-making
- There is a high patient adoption of personalized services, home hospital, and monitoring
- AI is used to proactively monitor patient data and provide alerts on the outliers for clinical follow-up

For more in-depth analysis or further assistance, please contact ECG Management Consultants (www.ecgmc.com).

Conclusion

Designing a roadmap for tomorrow begins with knowing where you are now

All hospitals deal with their own specific patient demographics, and face their own specific challenges. It is by recognizing their own unique needs that organizations can reach the innovator stage. They must start with one question: does our hospital have the right foundation to support all of our operations? As large volumes of data continue to flood in, investment in the right data infrastructure will be crucial to translating it into meaningful information. Only then can an organization begin to optimize its internal processes such as registration, scheduling, financial clearance, check-in, charge capture, billing, and follow-up. Not only are these processes critical to financial performance and workforce efficiency, they also have a direct impact on patient experience across the care continuum. The care journey begins before patients get to the hospital, and continues on after they have left, and a patient portal ensures a seamless care experience pre- and post-care. Finally, technologies that enable personalized medicine allow organizations to offer the right treatment, at the right time, for every patient, which is the goal of true patient-centered care.

Digital transformation is not about simply adopting the latest technology. The success of a digital transformation requires healthcare leaders to deeply understand their patients' values and expectations, and be able to build expertise and empower staff to work in new ways. But leaders do not have to be alone in this journey. They would benefit from exchanging best practices and lessons learned with other innovators. There are communities around the globe where like-minded colleagues can gather to connect and discuss the latest trends in health technology. Healthcare-focused consulting companies can also conduct more in-depth analysis of individual hospitals' needs, and provide tailored recommendations. By having a clear understanding of the digital maturity level of their organizations, leaders can design a roadmap for future growth, leading their teams to new heights, and giving their patients the best care possible.

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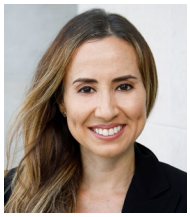

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ECG Management Consultants

ECG specializes in providing consulting assistance to leading healthcare providers across the U.S. In November 2019, ECG entered into a partnership agreement with Siemens Healthineers, the global leader in medical technology and digital health transformation. Through its knowledge and expertise built over completing more than 12,900 major consulting projects of different types for more than 2,500 leading healthcare organizations for nearly 50 years, it pulled together best practices on digital transformation and developed a framework to measure the digital maturity of a hospital in a holistic way. As an independent affiliate, ECG collaborates with the Siemens Healthineers' global enterprise services practice, providing subject matter expertise, smart counsel, and pragmatic solutions.

Suggested follow-up on

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- Siemens Healthineers Insights paper issue 12: This changes everything – The COVID-19 pandemic leads to a significant acceleration of digitalization in healthcare. Available at: **siemens-healthineers.com/insights/news/accelerate-digital-health-transformation.html**
- Siemens Healthineers Insights paper issue 16: Who are the leaders in digital health and what can we learn from them in times of COVID-19? Available at: **siemens-healthineers.com/insights/news/leaders-in-digital-health**
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