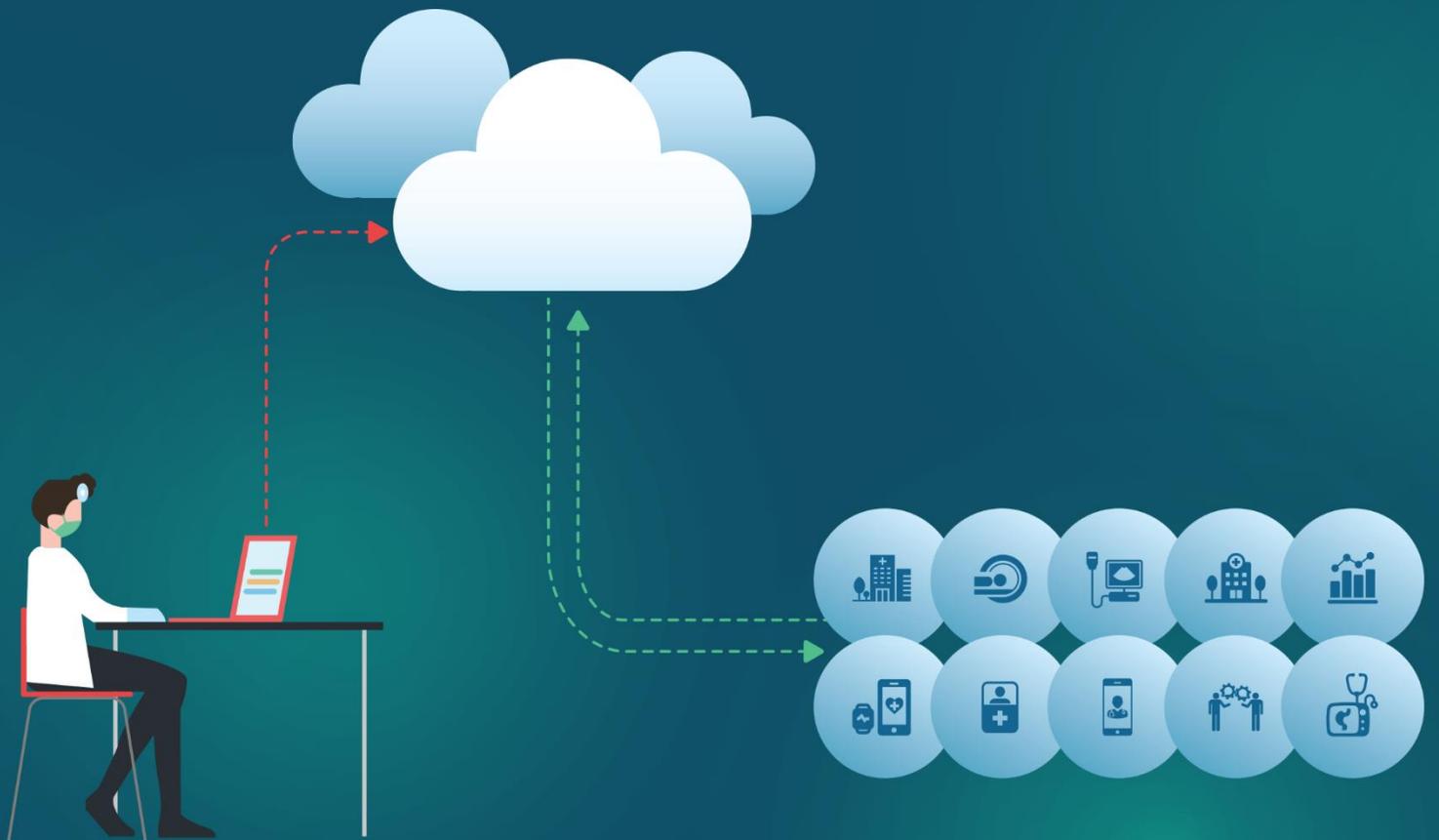


Cloud Technology is Transforming the Healthcare Industry

A thought paper by Scalable Health



SCALABLE
HEALTH

INTRODUCTION

Every day we read about big changes on the healthcare horizon as a result of a variety of technologies enhancing our ability to collect data from a variety of sources including wearables, EMRs, and telemedicine. These changes offer great opportunities for the advancement of care option as we begin to deliver the right data to the right people at the right time. AI is able to diagnose cancer more accurately than human counterparts. Big Data is supplementing care provider's knowledge gaps for improved care outcomes. Wearable Tech is freeing patient recovery from traditional hospital environments by allowing us to monitored remotely in the comfort of our own homes surrounded by loved ones. And the list goes on and on.

The challenge is despite these great advances, most healthcare data still resides on old legacy systems that are unable to process, let alone communicate, data in real-time. Care providers still request paper files. Hospitals still use faxes. Test results, billings, and other administrative functions are still beholden to antiquated systems that have remained the same for years, if not decades.

Advances in digital communications offer consumers instant, or very close to, gratification. Amazon Prime delivers our purchases the next day. Netflix offers entire seasons of our favorite shows in real-time. And just about everything else is but a click away on our smartphones. Everything, that is except healthcare.

Patients are consumers used to real-time access to information. They are informed and they demand more from their payers

and providers. Whether its Dr. Google or online support forums, they know their options and want to actively participate in the care programs. They have options when it comes to selecting hospitals and care providers. Healthcare must shift from a volume-based model to value-based care models that focus on patient engagement and experience.

At the same time, the hospital landscape is changing. With advances in telemedicine and the potential for personalized medical records, patients and providers are no longer tied to physical locations to access care. Providers can monitor our vitals remotely via wearables. Through online connectivity, patients and providers will have access to specialists around the world 24/7 to read X-rays, consult on rare diseases and offer real-time insights from which to develop informed care decisions.

Hospitals will continue to focus on acute care but closer to home. The hospital of the future will be smaller with even greater functionality than the current large regional centers. Providers will be freed from most administrative tasks to focus on care delivery. Their years of experience will be supplemented with real-time access to all the available medical studies and treatment options by a simple search on their iPads. AI will offer greater insights and earlier detections for quicker interventions and personalized medicine will allow providers to offer the best possible care option tailored to each and every patient.

The path to the hospital of tomorrow is cloud technologies.

EMERGING TRENDS IN HEALTHCARE DRIVING HEALTHCARE INNOVATION

The healthcare environment is changing. Technological advances are impacting how providers interact with patients, payers, and team members. Data Analytics and AI are offering powerful insights that improve the quality of care and drive operational efficiencies. These advances coupled with changing patient demographics are shifting the healthcare landscape.

Aging Population and Chronic Care Needs

Medical advances are resulting in patients living longer lives. But with an aging population comes additional care needs. Older patients tend to be less mobile and therefore benefit from telehealth solutions and IoT technologies that allow them to remain in their home environment.

In addition to more demands for senior care, providers are seeing an increase in chronic conditions and comorbidities. For example, a patient suffering from cardiac problems may be more prone to suffer from depression. This comorbidity impacts the adherence to care plans impacting their care outcomes. AI and risk-stratification can identify high-risk patients whose care may be impacted behavioral issues such as opioid abuse or mental health concerns. This ensures the behavioral concerns are addressed and the needs of the whole patient are met.

Patient Engagement & Experience

Whether its Dr. Google or online support forums, patients are more informed and want to actively participate in the care programs. Value-based care offers them options when it comes to selecting hospitals and care providers. To meet the

demands of the consumer as a patient, healthcare organizations must focus on patient engagement and experience.

Medical innovations, such as telemedicine, support patient engagement and improve treatment compliance resulting in better care outcomes.

Value-Based Care

Healthcare payers and providers understand the need for value-based care – better care outcomes, greater operational efficiencies, and reduced costs – to meet the demands of their patients while focusing on the bottom line for shareholders. To deliver effectively, providers need access to real-time patient data to intervene as early as possible.

The ability to use predictive modeling to identify high-risk patients allows for care options that can prevent or offset the need for acute care while reducing readmission rates. AI allows providers to collect and analyze more data to offer even greater insights as to how to keep patients healthier. Machine Learning aids in risk-stratification to identify high-risk patients so providers can allocate the needed resources to address population health concerns and efficiently manage their operations.

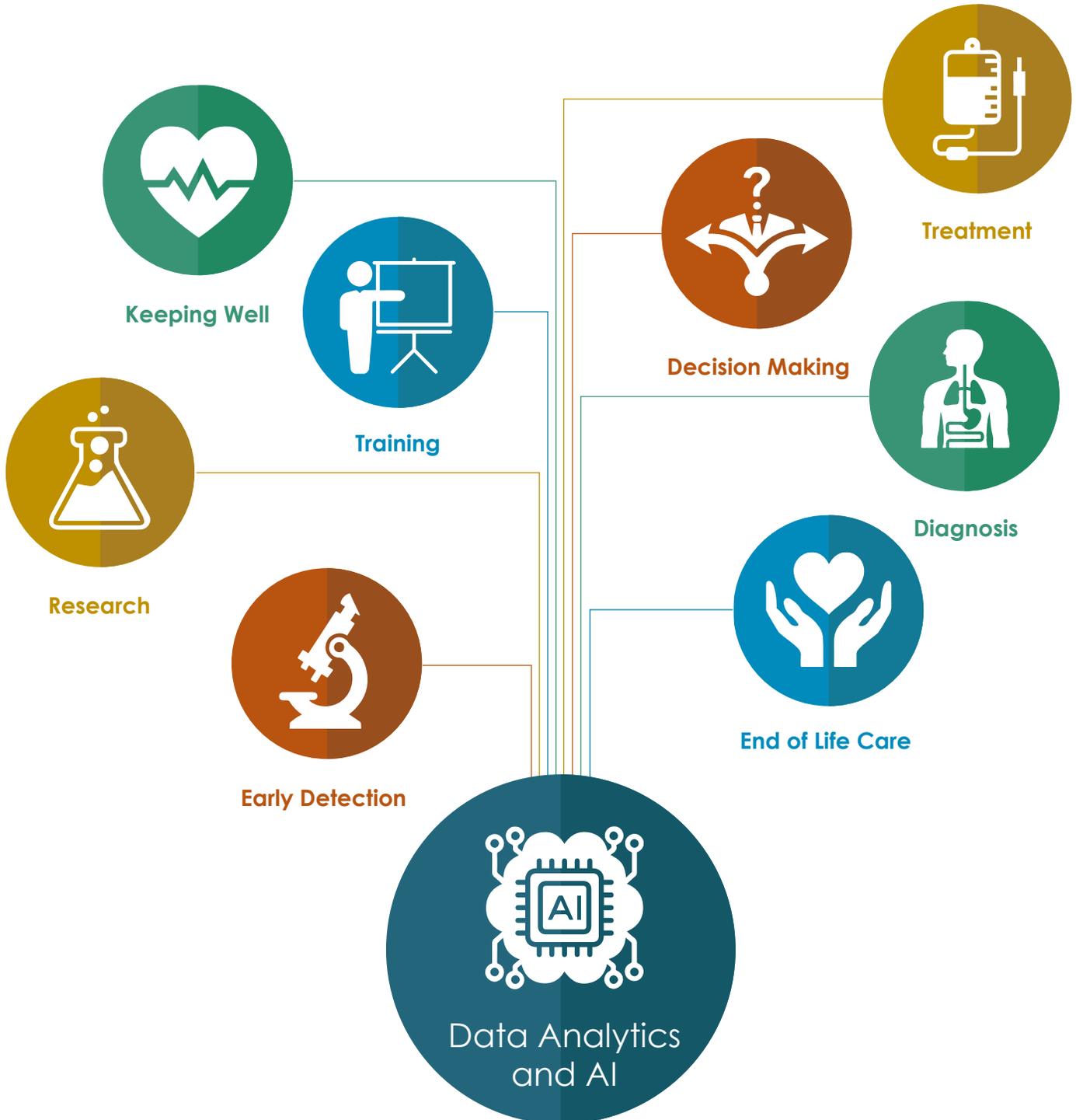
Wearables and Continuous Monitoring

Wearables and IoT are changing how providers are able to monitor patients. For example, traditionally patients would visit a care provider and have their blood pressure taken.

This would result in potential diagnoses of high blood pressure and result in the patient begin medication. With wearables, we can continuously track a patient's reading rather than relying on a simple point in time reading to best determine the best course of action.

This is a key consideration in risk-reduction within the hospital environment, as well.

Continuous patient monitoring is used to identify any deterioration of a patient's clinical status so that immediate intervention can be undertaken. Data analytics offers crucial insights that can lead to actionable, time-sensitive insights that potentially drive pre-emptive actions and ultimately optimize care.



CURRENT CHALLENGES IN THE HEALTHCARE ENVIRONMENT

The hospital of tomorrow will look very different than the present centralized model. The centralized model has inherent risks associated with aggregating many patients into a single location including hospital-induced infections such as sepsis. Due to the non-communicative nature of today's healthcare, patients benefit from being physically in the same location as all of their providers. It is common to send patients to where the specialists are.

However, as telehealth options continue to improve the need for colocation lessens. In addition, wearables enable providers to remotely monitor recovery. It is expected hospitals will become smaller local, acute centers in the future and that a vast majority of patients will be able to recover in the comforts of their homes thanks to IoT.

Disparate Data Centers Built on Dated Legacy Systems

Many hospitals are still operating mission-critical applications including EMRs and other health IT systems on aging legacy systems. These are expensive to maintain as organizations need to acquire and maintain all the necessary hardware, software and personnel to ensure system availability. By shifting to a cloud-based solution, providers only pay for what they use (applications, storage, infrastructure services, etc.) and reduce the need for upfront capital expenditures.

In addition to the cost considerations, these systems historically face considerable

security challenges and impede communication between departments and other healthcare providers.

Data Security & Privacy

Data protection and privacy issues are addressed daily in the media. High-profile data breaches such as the WannaCry ransomware demonstrate the vulnerabilities of existing legacy systems. Regulations and compliance mandates such as GDPR and HIPPA demand that sensitive, personalized data must be protected at all costs. These challenges cannot be met in the current healthcare data environments.

Data Silos and Communication

Legacy systems do not communicate well with other systems and thus communication breaks down. In many hospital environments, providers are still operating with paper files. Providers are often beholden to other departments for test outcomes or reports and thus must wait for someone to deliver these results manually.

If the patient data resides outside the system, providers are often challenged to operate with incomplete patient histories or relying on patients self-reporting based on their subjectivity. One patient's interpretation of pain may differ from another. This results in knowledge gaps and potentially impacts care outcomes

DATA SECURITY & PRIVACY ON CLOUD



DRIVING THE PATIENT EXPERIENCE AND IMPROVED CARE OUTCOMES

Cloud-based services can help hospitals harness the power of Big Data more quickly while reducing costs and enabling a security-rich environment.

Access to Care

Historically, healthcare has brought the patient to the provider. In remote areas, this either means traveling great distances to access basic care or to simply go without. Advances in telemedicine have shifted this requirement and allowed patients to address care needs locally. A consult with a distant specialist can be done at the primary caregiver's office via telehealth solutions and testing and monitoring can be facilitated with wearables. This shift from location-based care offers greater care options to meet the patient's needs and results in an improved patient journey.

Driving the Patient Experience

Beyond the benefits of telehealth, patient experience can be improved by data-driven insights. AI is proving superior in predictive diagnostics resulting in earlier detection in many areas including cancer and Alzheimer's detection. This allows providers to intervene earlier potentially eliminating or delaying onset. Identifying high-risk patients allows for greater treatment options and the

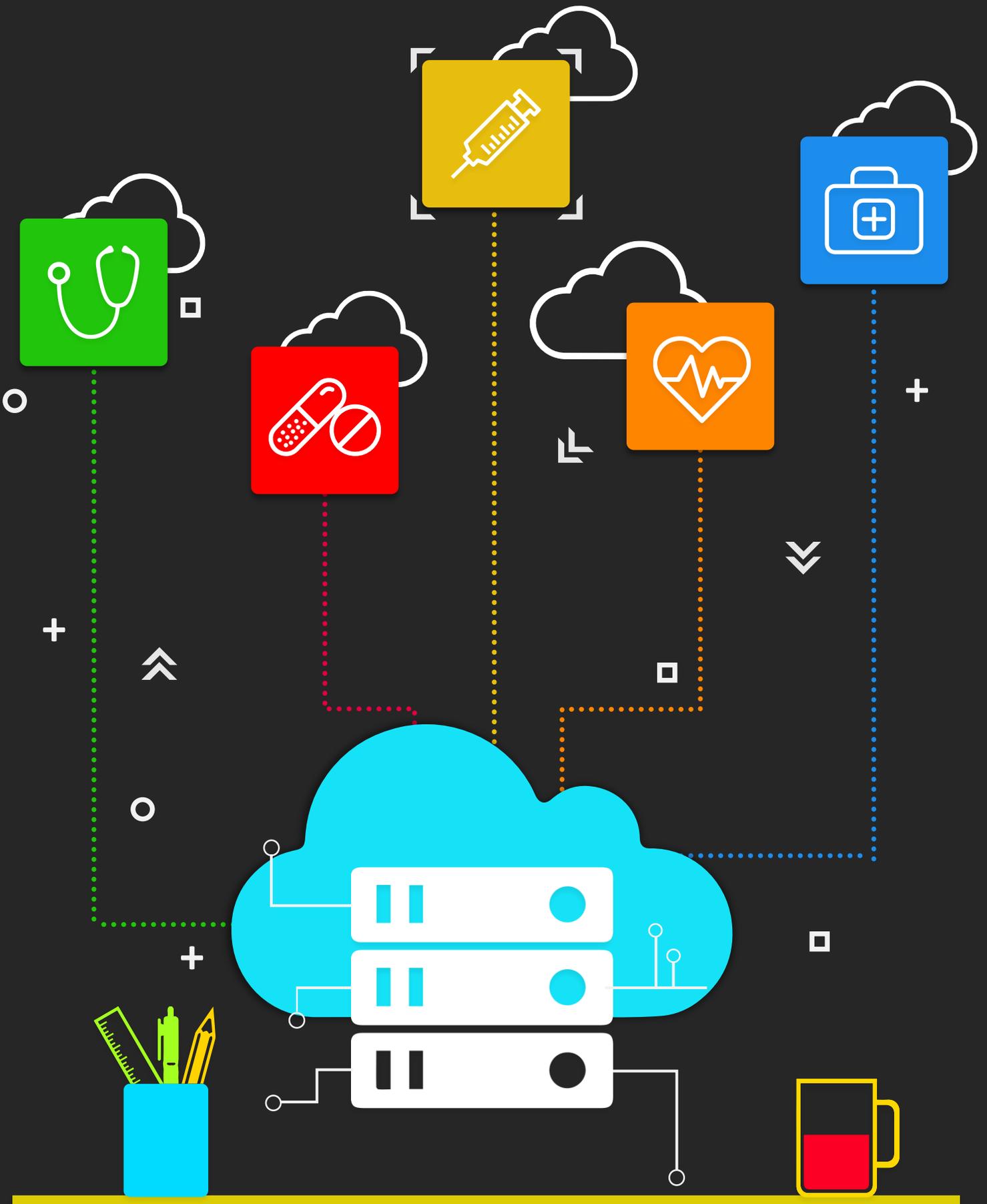
avoidance of acute care situations such as emergency room visits or hospital readmissions. Keeping patients healthier longer is the ultimate patient experience.

Drug Theft and Counterfeiting Prevention

The Drug Supply Chain Security Act (DSCSA) requires healthcare to monitor and report status on the complete chain of custody of pharmaceuticals. Digital solutions can identify high-risk abusers for preventative initiatives and enable monitor and control solutions to curb theft and abuse. Furthermore, these solutions can document and report compliance.

Medication Adherence

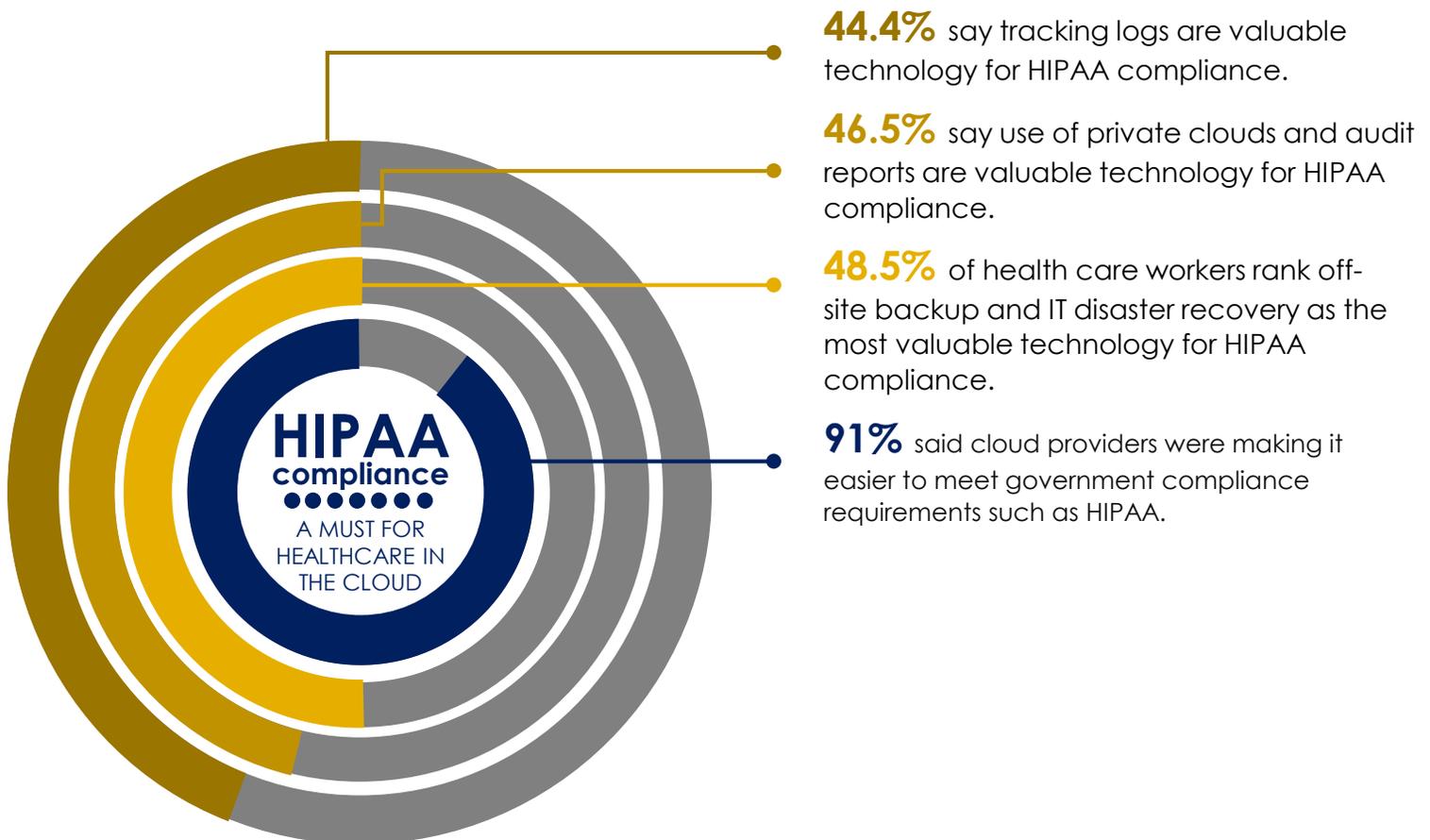
A primary cause for poor care outcomes is the lack of drug adherence. It is estimated this failure to follow the medication protocols prescribed by the doctor results in increased avoidable re-admissions at a cost of \$290 billion annually. Wearables can remind patients to take meds and send data back to providers indicating whether the patient is in compliance. This provides caregivers the opportunity to re-engage the patient and get them back on track before they begin to suffer adverse effects.



Uniform Medical Records

Each healthcare organization potentially develops its own means to collect and store patient data. Some choose paper

files, others create Electronic Health Records (EHRs or EMRs). Cloud-based solutions could offer a single standard to manage patient data which can easily be shared between different providers.



When it comes to HIPAA breaches involving paper charts happen more frequently than for EMRs. Only **7 of 479** breaches are related to EMRs.

When it comes to HIPAA breaches involving paper charts happen more frequently than for EMRs. Only **7 of 479** breaches are related to EMRs.



Many healthcare organization are choosing private cloud to control security and access

ADDRESSING HOSPITAL IT NEEDS

Regulatory mandates, advances in treatment options, and data security have increased the complexities and risks that healthcare organizations are tasked with managing the IT infrastructure. Shifting to a cloud-based solution begins to address the ongoing needs of healthcare organizations while driving operational efficiencies and reducing costs.

Data-Driven Initiatives

Data-driven medical breakthroughs as a result machine learning allow providers to gain greater insights into patient care. Predictive analytics can identify high-risk patients. This empowers providers to diagnose earlier, offer interventions to prevent or delay the onset of disease and reduce the need for acute care. Keeping patients healthier longer and reducing the potential for readmissions.

Design for Privacy

With recent data breaches and the publicity surrounding companies taking liberties with personal, sensitive information - patients have become more aware of their privacy rights.

Furthermore, legislation and regulations mandate data security and compliance to Health Insurance Portability and Accountability Act (HIPAA) or GDPR potentially imposing expensive fines or other avenues of legal recourse. Failure to protect patient data undermines patient confidence and the patient experience to the detriment of the organization's brand.

Real-Time Analytics

The best care outcomes are when patients and providers work together to determine

the best care options available based on informed decision making supported by comprehensive, real-time patient data along with insights provided by AI to supplement the potential knowledge gaps.

Providers must be able to integrate a variety of data from wearables, EHRs, population health data sets and patient test results from a variety of disparate sources. To do so, they will need a central repository such as cloud computing to ensure the right persons receives all the right data at the right time.

Resource Efficiency

Cloud-based services can help healthcare organizations harness the power of Big Data while reducing costs and enabling a security-rich environment. It enables users to collaborate and solve problems faster, IT and data professionals to deliver more trusted data to more people, and developers to create compelling mobile applications.

Cloud solutions help organizations generate operation intelligence from machine data and integrate data seamlessly with existing storage and operational platforms.

Security

Cloud security solutions prevent unauthorized data access, alert of changes or leaks to help ensure data integrity, automates compliance controls and protects against internal and external threats.

CLOUD TECHNOLOGY ENABLE TOMORROW'S HEALTHCARE

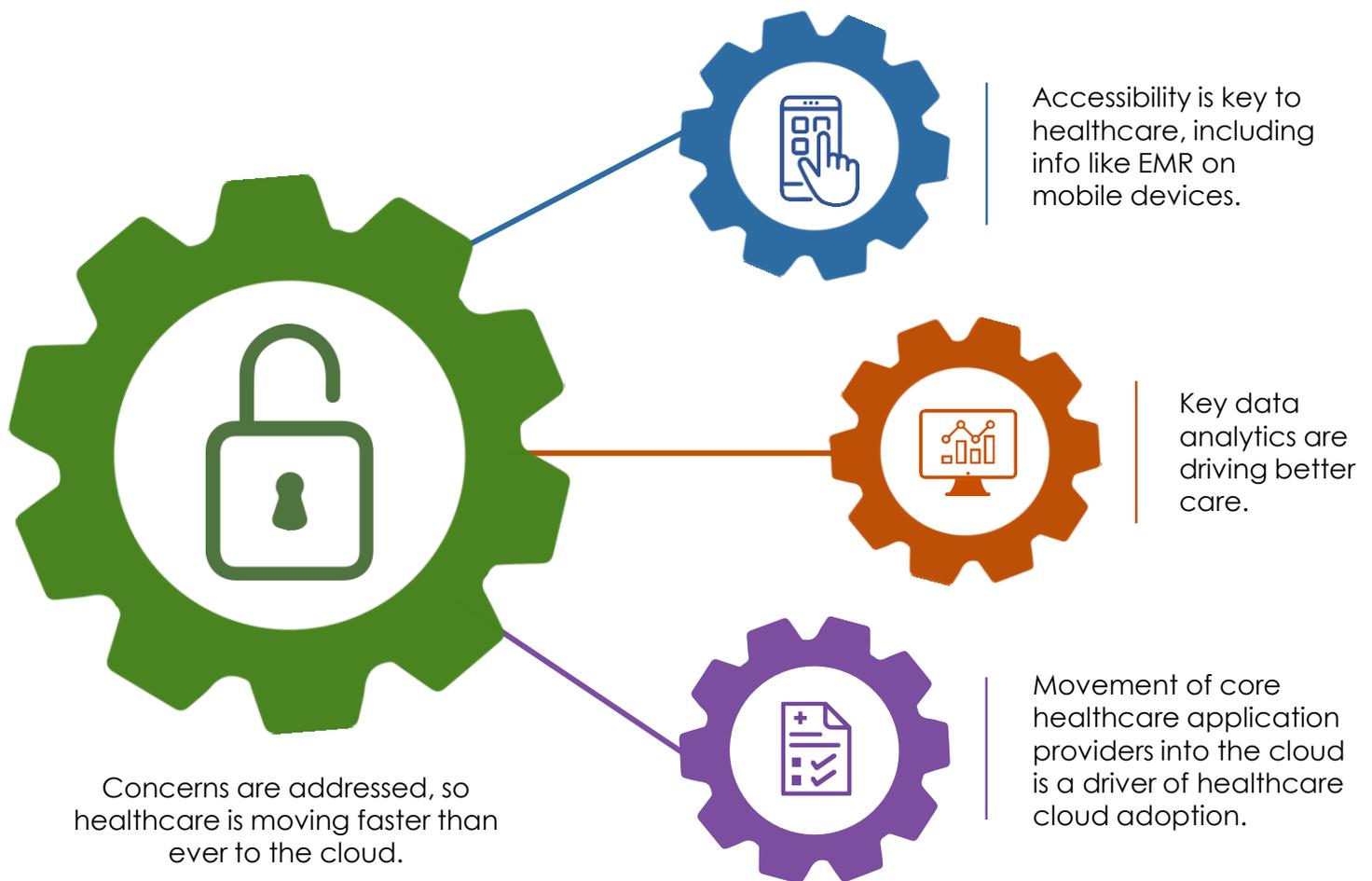
Advances in healthcare technologies are changing the way providers meet the demands of today's consumer-driven patients. Other industries provide 24/7 access to customer service agents, online transparency and real-time turn around of deliverables. Patients expect the same consumer-centric focus that they experience in other basic interactions with service providers.

Big Data Analytics and AI offer actionable insights to drive better care outcomes. Population Health datasets track health trends and provide early warnings to potential health emergencies. Risk-stratification helps identify high-risk patients to drive earlier intervention. Machine Learning and Deep Learning can drive

diagnostic advances including early cancer detection or Parkinson's onset.

As patients have options when it comes to selecting healthcare providers, healthcare organizations need cloud technologies to deliver real-time access to patient data to drive the best care outcomes. This requires a shift from legacy systems to more secure cloud-based solutions. Cloud computing allows providers access to the right patient information at the right time combined with a knowledge base of healthcare best practices and the latest medical research to make informed care decisions.

Cloud Technologies will enable tomorrow's healthcare advances.



About Scalable Health

Scalable Health is healthcare division of Scalable Systems focused on providing innovative products and solutions in healthcare and life sciences market.

www.scalablehealth.com

About Scalable Systems

Scalable Systems is a Data, Analytics & Digital Transformation Company focused on vertical specific innovative solutions. By providing next generation technology solutions and services, we help organizations to identify risks & opportunities, achieve sales and operational excellence to gain an innovative edge.

www.scalable-systems.com

Copyright © 2019 Scalable Health. All Rights Reserved.

While every attempt has been made to ensure that the information in this document is accurate and complete, some typographical errors or technical inaccuracies may exist. Scalable Health does not accept responsibility for any kind of loss resulting from the use of information contained in this document. The information contained in this document is subject to change without notice. Scalable Health logos, and trademarks are registered trademarks of Scalable Systems or its subsidiaries in the United States and other countries. Other names and brands may be claimed as the property of others. Information regarding third party products is provided solely for educational purposes. Scalable Health is not responsible for the performance or support of third party products and does not make any representations or warranties whatsoever regarding quality, reliability, functionality, or compatibility of these devices or products.