

Healthcare Systems In A Post Pandemic World A Citrix Point Of View

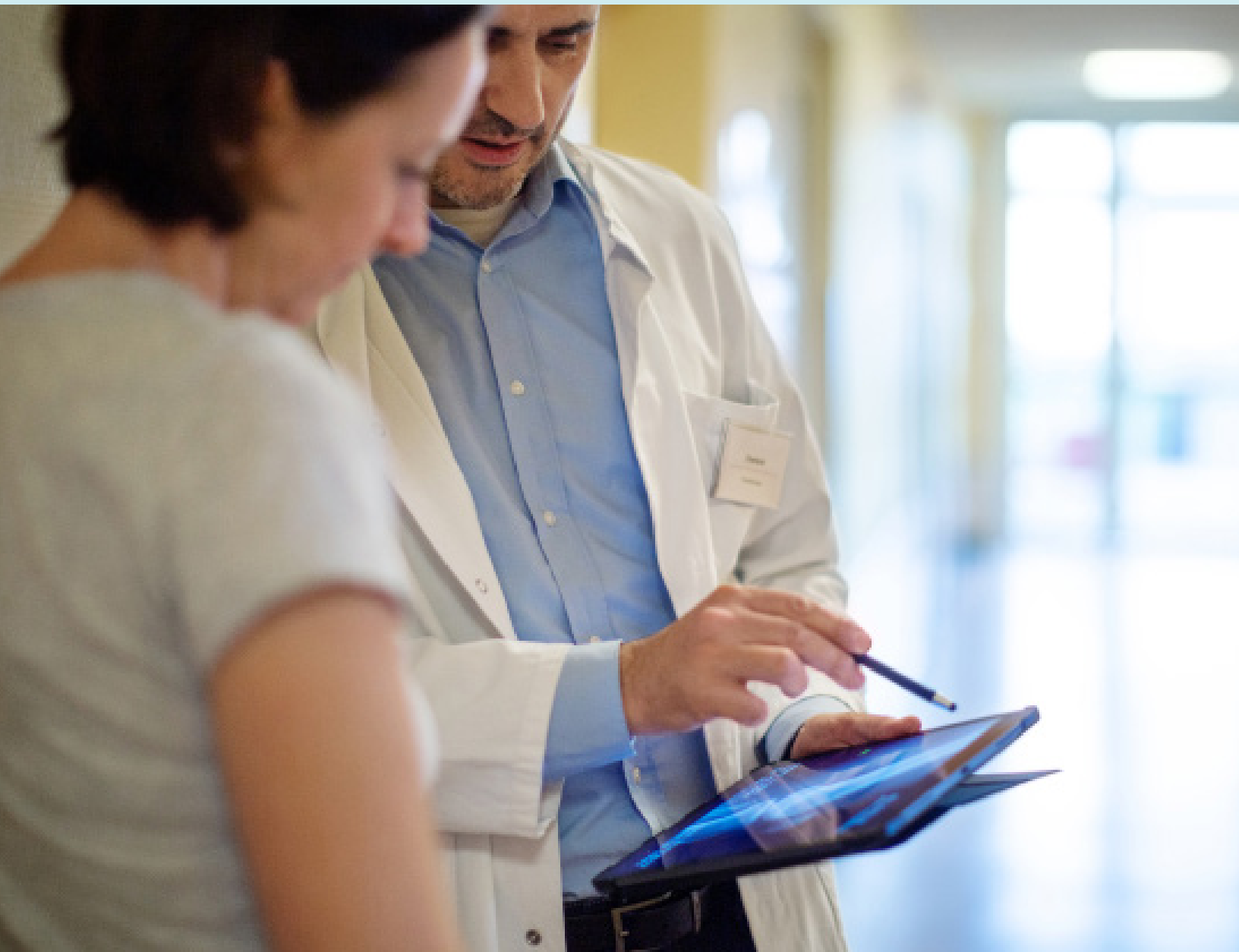


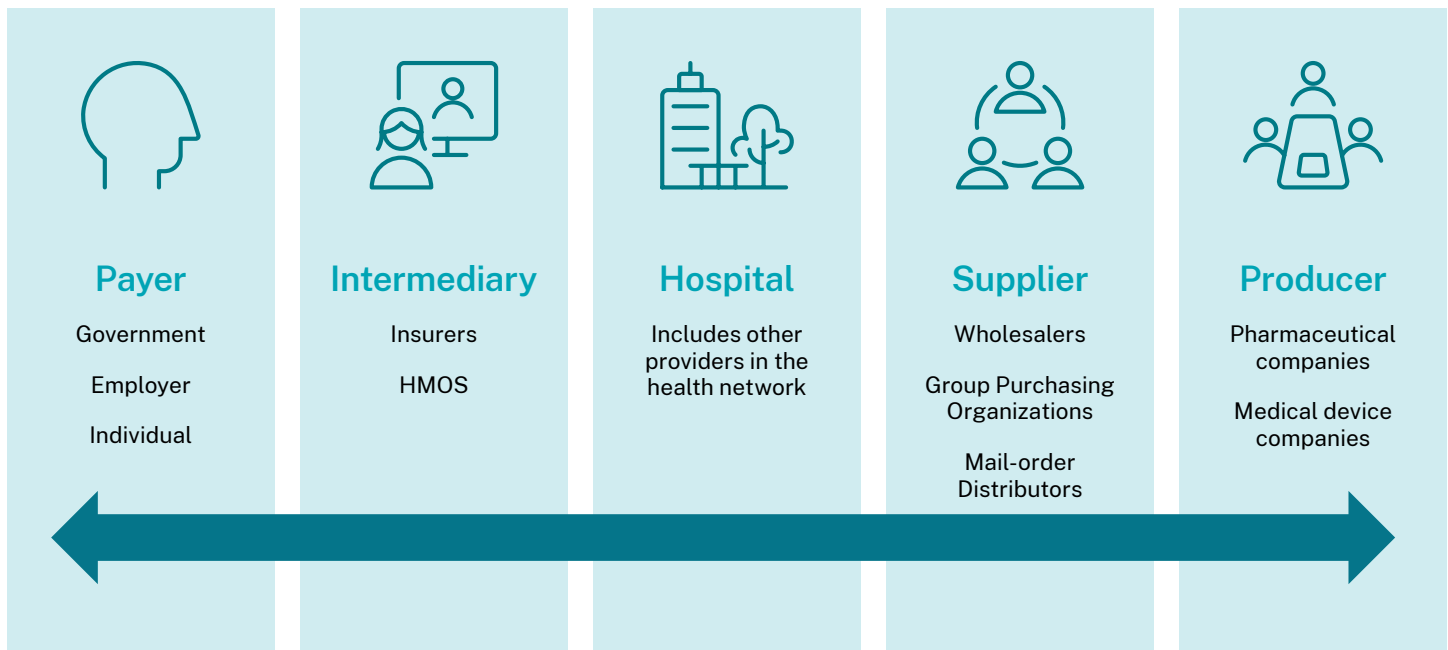
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Understanding Hospital and Health Network System

Hospitals and health systems both provide inpatient (acute) and outpatient medical services. However, a health system is a larger entity than a hospital: typically, it includes at least one hospital plus at least one group of physicians. Hospitals and health systems function through interactions with several other participants in the value chain: payers, intermediaries, suppliers, and producers (Fig. 1).

This document examines top trends, challenges, and associated IT requirements for hospitals and health systems globally, with a predominant focus on the United States, and describes Citrix solutions that address them.



Industry Statistics

Hospitals and health systems are among the cornerstones of the healthcare industry. Here are some statistics:¹



6,210

Total number of U.S. hospitals



931,203

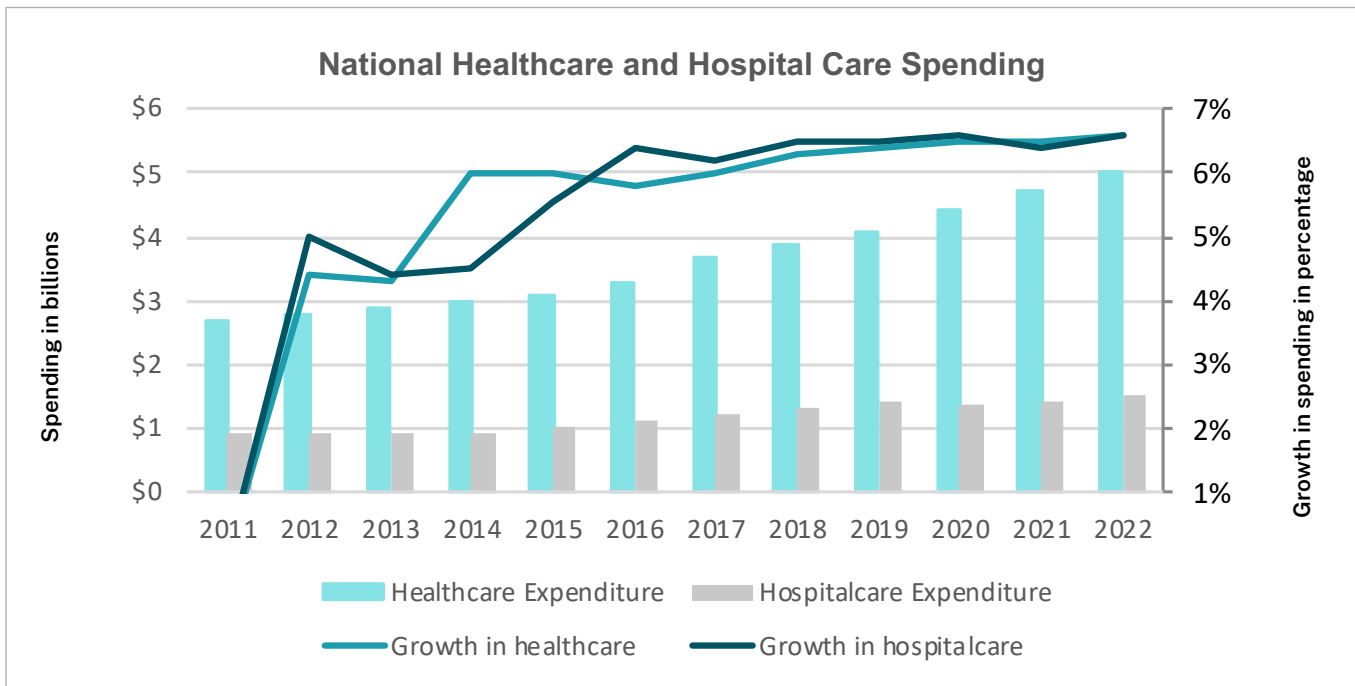
Total number of staffed beds in all U.S. hospitals



\$1.01 Trillion

Total expenses for all U.S. hospitals

According to the U.S. Centers for Medicare & Medicaid Services (CMS), national health spending is projected to grow at an average annual rate of 5.5 percent for 2020-2028 and to reach \$6.2 trillion by 2028.² The health share of the economy is projected to rise from 18 percent in 2019 to 19.7 percent in 2028.³



Healthcare spending is influenced by population growth, population aging, disease prevalence, and utilization of services.

However, arguably the largest factors are high prices for services and goods, from physician and hospital services to diagnostic tests to pharmaceuticals, and administrative complexity.⁴

Initiatives that offer opportunities to reduce those costs, according to Goldman Sachs, are telehealth, remote patient monitoring, and behavior modification.⁵

Strategic trends within the hospital and health system sector

As healthcare costs continue to rise and payers place greater emphasis on quality of care rather than fee for service, digital initiatives offer potential savings by moving care from acute to outpatient and home settings and facilitating early diagnosis, increased prevention, and better disease monitoring and management. Digital devices and applications are helping patients become better decision makers about their own health by providing personalized insights. They also help clinicians by extending reach, improving efficiency, and strengthening the patient-provider relationship.

The acceleration of digital healthcare will put greater demands on the IT departments of hospitals and health systems, leading to increases in healthcare IT spending, which is forecast by Gartner to grow by 4.8% in 2020 to \$136 billion.⁶ As IT budgets increase, CIOs are expected to play an larger role in healthcare operations and business strategy.

The growth in healthcare IT spending is driven by five macro trends:



Telehealth



Value-based care



Cloud computing



Electronic health records optimization



Cybersecurity

Each of these trends presents challenges that Citrix solutions can help to solve.



Telehealth

Telehealth

Telehealth applications allow patients to consult in real time with clinicians, including specialists, located practically anywhere in the world. It also enables asynchronous communications and data collection. Telehealth software leverages the Internet and wireless communications to bring patients and clinicians together in a secure environment. This broad category includes various modalities: videoconferencing, streaming media, secure messaging via patient portals, store-and-forward imaging, and remote monitoring.



Market Trends

The global telehealth market size was valued at \$61.40 billion USD in 2019 and is projected to reach \$559.52 billion by 2027, exhibiting a CAGR of 25.2% during the forecast period.⁷

Prior to COVID-19, the provision of healthcare services via telehealth varied dramatically across providers, with significant differences based on the organization's size, type, specialty, and even its market sector. Virtually overnight, the pandemic changed telehealth from a "nice-to-have" capability to a strategic imperative by enabling healthcare organizations to provide vital services to patients in a safe and effective way. Arizton's recent research report stated that the U.S. telehealth market is expected to reach \$10 billion by 2020, with year-over-year growth of around 80% due to COVID-19.⁸



Benefits

Cost control is a major benefit of telehealth. A set of recent studies that compared telehealth to traditional outpatient care recorded savings estimates ranging from 17% to 75%.⁹ Contributing to this cost saving is better staff utilization. In addition, it was noted that hospitals can save up to 40% by using a telehealth provider versus employing a full-time, onsite physician.

On the revenue side, many hospitals have seen admissions go up by 26% after implementing a telehealth program. Telehealth allows physicians to bill for uncompensated phone calls while extending hours to capture more billable time. It also cuts down on no-shows and improves the efficiency of a practice.

As noted above regarding COVID-19, another advantage is flexible access to care for people who are home-bound and those who live a great distance from healthcare services.



Technology impact

Telehealth requires deployment of the latest telecommunication devices, high-speed Internet with high bandwidth, and storage capacity for the integration and transmission of medical data. These components are still lacking in many developing countries.

Imaging technology or peripheral devices allow health providers to see and hear patients even when they are miles apart. Digital stethoscopes, for instance, can transmit heart and lung sounds to remote providers. Integration of web-based conferencing services like Microsoft Team and Zoom with healthcare applications such as Epic and Cerner can provide deeper and richer understanding of each patient.



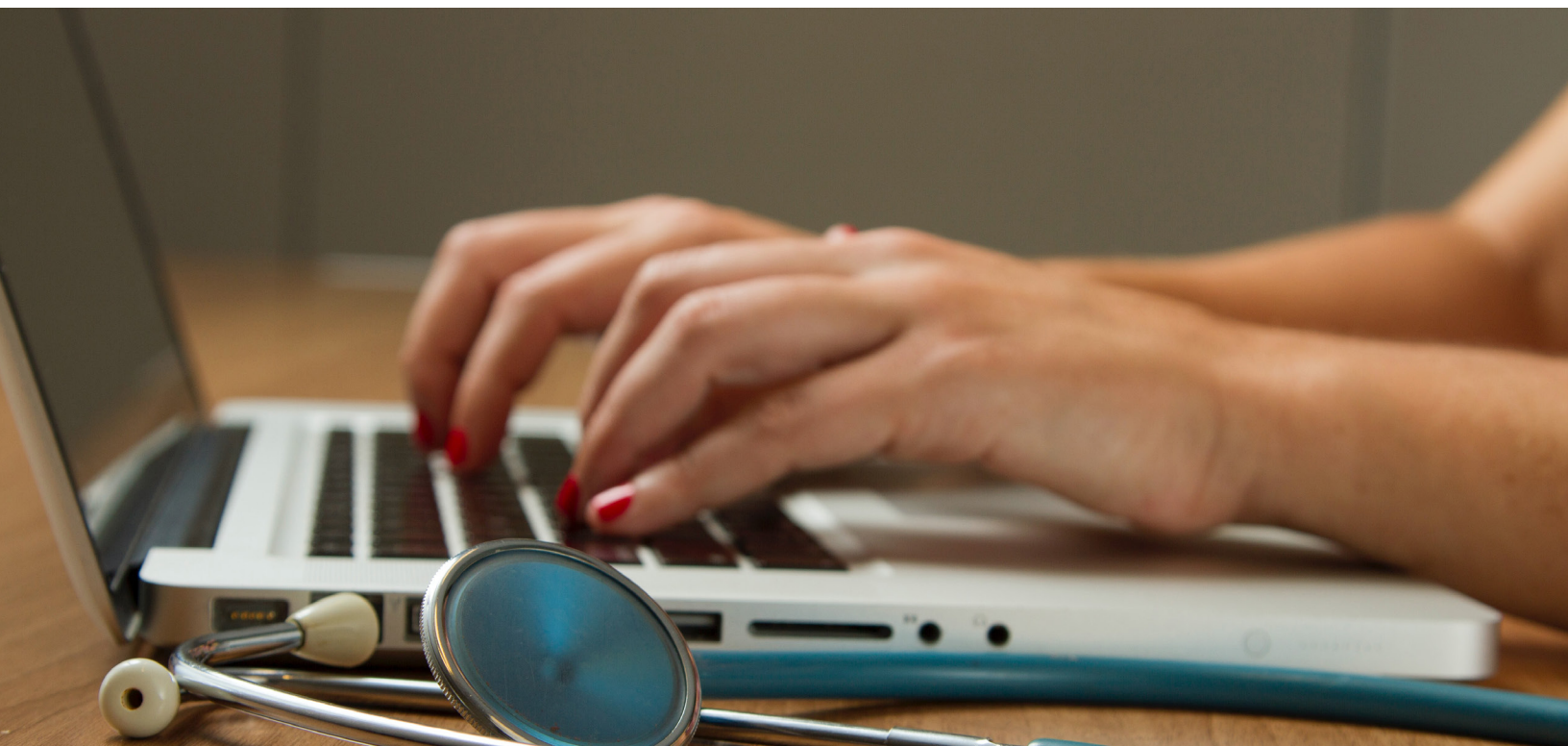
Citrix solutions for telehealth

Citrix offers customers flexible solutions based on Citrix Workspace and HDX that enable telehealth applications – whether running on premises or in the cloud – to be launched securely.

When Citrix Workspace and HDX technology are used to virtualize and deliver electronic health records, it is easy for a clinician to launch a telehealth visit through the EHR. Almost always, a clinician starts by accessing the patient's record in the EHR, and then launches a video session using Zoom, WebEx, or another conferencing solution directly from the EHR application. Clinicians and patients can use the client device and operating platform of their choice.

When working within the Citrix Workspace environment, clinicians can launch any application, including Windows, web, SaaS, and mobile apps. This provides a native-like experience while securing confidential patient information.

Further, launching telehealth applications delivered through Citrix Workspace lowers resource consumption by offloading multimedia rendering to the user's endpoint, thereby reducing infrastructure expenses and improving the user experience. Reducing demand on servers increases the number of users that can launch telehealth applications and lowers bandwidth consumption.





Value Based Care

Value Based Care

Value-based care (VBC) is a reimbursement model that rewards healthcare providers for providing quality care to patients, rather than simply delivering services (e.g., fee for service or capitated model). For example, CMS has multiple value-based programs, such as the [Hospital Readmissions Reduction Program \(HRRP\)](#), which aim to reduce avoidable readmissions through infection control, discharge planning, and other initiatives.

By using the VBC approach, CMS and other payers seek to achieve higher care quality for patients, better management of health for populations, and lower costs.

Delivery of value-based care is tied to three areas of the healthcare network:



Clinical Workflows

Improved administrative efficiency frees up clinician time for direct patient care



Healthcare Technology

Remote monitoring of patients (especially those with chronic conditions) and regular communication between providers and patients can improve disease management and support prevention



Patient Engagement

Increased interactions with providers – both virtually and in person – can promote patients' involvement in their own care and strengthen compliance with prescribed therapies



Market Trends

The global VBC market is forecasted to grow at an impressive CAGR of +8% during the period 2020 to 2026.¹⁰

One factor that is expected to fuel adoption of VBC is the COVID-19 pandemic. As providers who use the fee-for-service approach lose revenues due to fewer in-person visits, the industry is recognizing the desirability of value-based reimbursement.

Another impact of the pandemic has been the recognition that not all medical care and diagnostic tests are necessary or appropriate. The fee for service reimbursement model encourages what is called “low-value care,” or care that provides little or no therapeutic value to patients. With VBC, providers are rewarded for results (outcomes), not the delivery of care, and this helps incentivize them to do what is best for patients.¹¹



Benefits

Value-based care reduced healthcare costs by an average of 5.6%, improved provider collaboration, and created more impactful engagement with payers, according to a study from Change Healthcare.¹²

Almost 80% of payers reported improvements in care quality from providers receiving value-based reimbursement. In addition, 64% of payers reported improvements in provider relationships and 73% said patient engagement improved by using value-based care.¹³



Technology Impact

According to [Forbes](#), technology plays a big role in the shift to VBC because benchmarking and reporting on patient outcomes and care quality call for “unprecedented health data and analytics, increased patient engagement and heightened visibility into the patient journey.”¹⁴

Many hospitals and health systems are hesitant to adopt this new model for care delivery and reimbursement because of internal or external technical limitations, primarily interoperability between systems and applications.

Artificial intelligence (AI), bioinformatics, and blockchain should prove instrumental to accelerating the evolution of VBC. Bioinformatics can help to analyze large volumes of genetic data, while AI can speed up the diagnostic process and blockchain can improve security of data sharing between payers and providers essential for VBC. However, the more immediate needs are integrated and secure access to the EHR, better workflows to automate and alert caregivers on patient actions, and closer integration with patient monitoring systems.



Citrix solutions for VBC

As mentioned above, VBC impacts clinical workflows, healthcare technology, and patient engagement. Citrix technology helps streamline clinical workflows by eliminating the need for doctors and nurses to search multiple sources for information on their patients. Citrix Workspace makes available to clinicians all the resources they need, from the EHR to files and video conferencing tools, on any device. Centralized access to all these resources helps present a holistic view of the patient and avoid errors caused by missing or overlooked information.

Citrix microapps help streamline the use of complex enterprise software. These small, task-specific applications deliver highly targeted functionality to the workspace. Instead of being overwhelmed by technology complexity — more apps, more logins, more notifications, and more information scattered across numerous locations — healthcare workers can use microapps to simplify and streamline the workflow by reducing “noise,” addressing the most relevant tasks first, and remaining productive. Expediting everyday tasks such as appointments and charting allows clinicians to devote more time to patient care.





Cloud Computing

Cloud Computing

Hospitals and health systems generate and store large amounts of clinical and administrative data. Information ranges from entries in a patient's medical record to pharmacy sales and insurance claims. The volume of this digital data is growing exponentially every year, due in part to changes in the payer environment, such as incentives for the meaningful use of EHRs and the need to document VBC for reimbursement.

The effective management of data requires significant computing power and IT bandwidth. To store data on premises, hospitals and health systems must invest in more IT infrastructure as the data load increases. Cloud computing, on the other hand, enables big data operations by supplying massive storage capability and processing power. Additionally, cloud-based analytical tools help hospitals and health systems better manage patients by transforming health data into actionable insights.



Market Trend

The global healthcare cloud computing market is projected to reach \$51.9 billion USD by 2024, up from an estimated \$23.4 billion in 2019 at a CAGR of 17.2% during the forecast period.¹⁵

According to the Flexera “2020 State of Tech Spend Report,” 44% of the healthcare participants in its survey indicated they were increasing the number of cloud initiatives they had embarked on.

A recent report by PWC stated that the transition to cloud has been further accelerated by the COVID-19 crisis: cloud spending globally rose 37% to \$29 billion during the first quarter of 2020.¹⁶ This trend is likely to persist as the virtual work trend increases the need for scalable, secure, reliable, and cost-effective off-premises technology services. In fact, despite the economic downturn due to the pandemic, cloud spending is estimated to rise 19% in 2020, even as IT spending as a whole is forecast to fall 8%, according to industry analyst Gartner.



Benefits

Moving to the cloud has benefits for both healthcare providers and patients. It has proven beneficial for cutting operational expenses while helping providers to deliver high-quality, personalized care.

The specific value driven by cloud computing in healthcare includes:

- **Reductions in infrastructure costs.** Using a cloud service instead of an on-premises datacenter can free hospitals and health systems from the need to purchase and maintain server hardware. Further, only paying for the compute and storage resources that are actually used can increase these cost savings.
- **Availability and interoperability.** As a result of interoperability between connected medical devices and the various systems and applications that store patient data fueled by cloud adoption, patient data is readily available for analysis and insights to facilitate healthcare planning and delivery. Cloud computing works on the basis of on-demand availability of resources like data storage and computing power, so customers only pay for what they use. This helps to keep costs down.
- **Digitization of records.** Electronic health records stored in the cloud can be updated by multiple clinicians, creating a centralized and current view of the patient.
- **Faster integration of new entities.** Integrating new clinics and hospitals into a health system is simpler, faster, and easier with cloud computing as the common platform. Costs go up when the business platforms to be integrated are significantly different.



Technology Impact

Cloud computing is finally making inroads in the healthcare industry, which has often resisted it because of regulatory requirements and the fear of losing control of data.

Because data security and privacy are two primary concerns of hospitals and health systems when choosing a cloud solution, a realistic deployment model could be the private cloud. A private cloud can be used to host sensitive patient data, which must be stored securely to comply with regulatory requirements for patient privacy. While hospitals may use public cloud services to host some workloads, thereby reducing IT management and cost, they often must host some critical data internally, and a private cloud is a good option.



Citrix solutions for cloud

According to Gartner, healthcare CIOs are becoming more comfortable with public clouds. Citrix cloud services, which simplify the delivery and management of Citrix technologies compared to on-premises deployments, support the use of public clouds to host workloads (application and desktop resources). Citrix provides the flexibility to mix and match public cloud capabilities to avoid vendor lock-in. This allows hospitals and health systems to optimize and tune public cloud capabilities to the needs of clinicians and the organization as a whole, rather than being forced into one particular cloud.

A cloud strategy also helps hospitals and health systems to refocus on patient care instead of operating increasingly large and complex data centers themselves.





Electronic Health Records

Electronic Health Records

The American Recovery and Reinvestment Act required public and private hospitals and health systems to adopt and demonstrate “meaningful use” of electronic health records by January 1, 2014, to maintain Medicaid and Medicare reimbursement levels. Electronic health record systems have streamlined clinician access to comprehensive patient information and given Federal agencies like CMS a powerful tool to promote VBC by using EHR data to evaluate quality of care.

However, many hospitals are not using EHRs to their full potential. They have opportunities to optimize the value of these solutions by re-engineering them, increasing adoption by physicians and other providers, and creating integrations with other critical software systems, which is especially important to enable VBC.

According to TrueNorth, EHR optimization aims to reduce the time physicians are spending trying to retrieve EHRs, reduce administrative burden, and improve usability by resolving technical bottlenecks such as aging hardware and user experience issues.¹⁷

Key trends include interoperability among different EHR solutions, technologies such as AI, voice recognition and predictive analytics, and the ability of patients to access their own records on demand.



Market Trend

The global electronic health records market is forecast to grow from an estimated \$30 billion in 2020 to \$40 billion by 2025.¹⁸ Growth is anticipated based on rising demand for centralization and streamlining of electronic healthcare systems, technological advancements in healthcare IT, and increasing awareness about the importance of EHR technology. Moreover, increasing government funding for the development of healthcare IT solutions are promoting the adoption of electronic health records globally.



Benefits

Electronic health records are fundamental but critical tools for the new era of value-based care. Hospitals and health systems need lots of granular data about their patients and populations to document outcomes.

Healthcare organizations can gain significant efficiency benefits by integrating systems and processes such as billing with the EHR. Integration reduces human error and rework. The interoperability of an EHR with other systems (appointment scheduling, telemedicine, bed reservation and tracking applications) and with wearable and mobile devices allows large quantities of information to be made available instantly to clinicians. This access not only saves time and money but also improves care delivery.



Technology Impact

A 2017 poll by KPMG in conjunction with the College of Healthcare Information Management Executives (CHIME) found 38% of CHIME members said they are prioritizing EHR optimization for their organizations.¹⁹

A leading practice for CIOs and health IT professionals seeking to optimize their EHR is to focus on the intake forms and clinical forms that medical teams use when seeing patients. By simplifying complex clinical forms to require only a few taps or clicks, clinicians can finalize notes in patient charts more quickly.

In addition, a re-engineered EHR system can allow for decision support and workflow logic. Such a system can remind team members of upcoming and overdue activities, suggest changes in the plan when patient conditions and care needs change, and route messages regarding new test results or patient events to the appropriate person.²⁰

Finally, optimization means looking beyond the EHR software and evaluating how business strategy can be enhanced or extended by incorporating other technologies such as:

- **Automation and AI:** specifically, the use of robotic process automation, virtual agents or chatbots for automating contact center operations, reading clinical notes and procedure data, and predicting missing charges in the revenue cycle.
- **Supply chain integration:** ensuring the right clinical products are available at the point of care without carrying a multi-dimensional inventory to meet every potential need.



Citrix solutions for EHRs

Citrix virtual apps and desktops solutions improve the usability of EHRs by enabling clinicians to securely access sensitive patient information on any mobile device, over any network. Apps and data securely follow healthcare staff members as they roam, while clinicians can reduce clicks and unnecessary relaunches of apps as they move from location to location. This is a key reason why major EHR vendors such as EPIC and Cerner recommend Citrix technology to virtualize and deliver their software.

Citrix solutions also reduce capital outlays and operational expenses by lowering the costs of endpoints and centralizing the management of application deployment and updates. Further, by supporting low-power endpoints, Citrix contributes to efforts to reduce overall carbon footprint.

Another Citrix solution, microapps, allows clinicians to integrate key functionality from an EHR with a telehealth application within the workspace. Instead of forcing a physician or nurse to search for information in the EHR, microapps can push actionable tasks and information proactively, helping to improve clinician efficiency. For instance, microapps can present relevant patient information stored in the EHR during a telehealth visit.

Citrix cloud solutions also allow hospitals and health systems to integrate other applications with the EHR, such as billing software and reporting tools for assessing providers' delivery of VBC.



Cybersecurity

Cybersecurity

Healthcare cybersecurity is a growing concern due to the exponential rise in healthcare data breaches in recent years. From 2018 to 2019, there was an increase of 37.47% in the number of patient records breached (from 13,947,909 records in 2018 to 41,335,889 in 2019). Vulnerabilities are growing, due in part to increasing adoption of connected Internet of Things (IoT) sensors used in medical monitoring and diagnostic devices and wearables.

According to Mordor Intelligence, “Hospitals are vulnerable to cyber-attacks because the existing tech systems are becoming increasingly complicated. Hospital staff relies on mobile devices, along with monitoring equipment. They are also responsible for the collection of personal details of their patients, including social security numbers, medicines they are taking, and credit card information. This makes them a primary target of attackers.”²¹

Another cybersecurity risk is the result of the pandemic. As some hospital and health system employees shifted to remote working, rapid implementation of technology led to security gaps, such as laptops without essential controls like full disk encryption and antivirus and antimalware tools, as well as the use of “shadow IT” by home-based workers.



Market Trend

The healthcare cybersecurity market is expected to register a CAGR of 11.82% to reach more than \$16 billion by 2025.²² The key factors responsible for driving market growth are an increase in cyberattacks and data breaches, regulatory requirements and government norms, and increasing use of IoT devices in the healthcare industry.



Benefits

Preventing cyberattacks through stronger security measures is critical for hospitals and health systems—and their patients.

Effective cybersecurity can:

- Help ensure compliance with patient privacy regulations and avoid fines
- Prevent interruptions in mission-critical healthcare IT systems caused by ransomware, viruses, etc.
- Protect the institution's reputation
- Avoid high costs: healthcare data breaches typically cost 65% more than data breaches experienced in other industry sectors.



Technology Impact

Laptops, smartphones, tablets, portable storage devices, and other mobile devices favored by clinicians to collect, transmit and retrieve patient data have led to new vulnerabilities. Hospitals and health systems need technology that can help them protect sensitive data from exposure on endpoints and encrypt it over the network. Access controls should be in place based on the principle of least privilege: granting employees only those privileges they need to execute their job effectively. Administrators should promptly revoke system access for employees who leave the organization.

Another area of cyber risk is the datacenter. Many hackers go through recently published lists of system vulnerabilities and then scan the Internet for systems that have not applied the patches needed to fix these gaps. Ideally, a hospital's IT system should check for and apply system updates automatically.

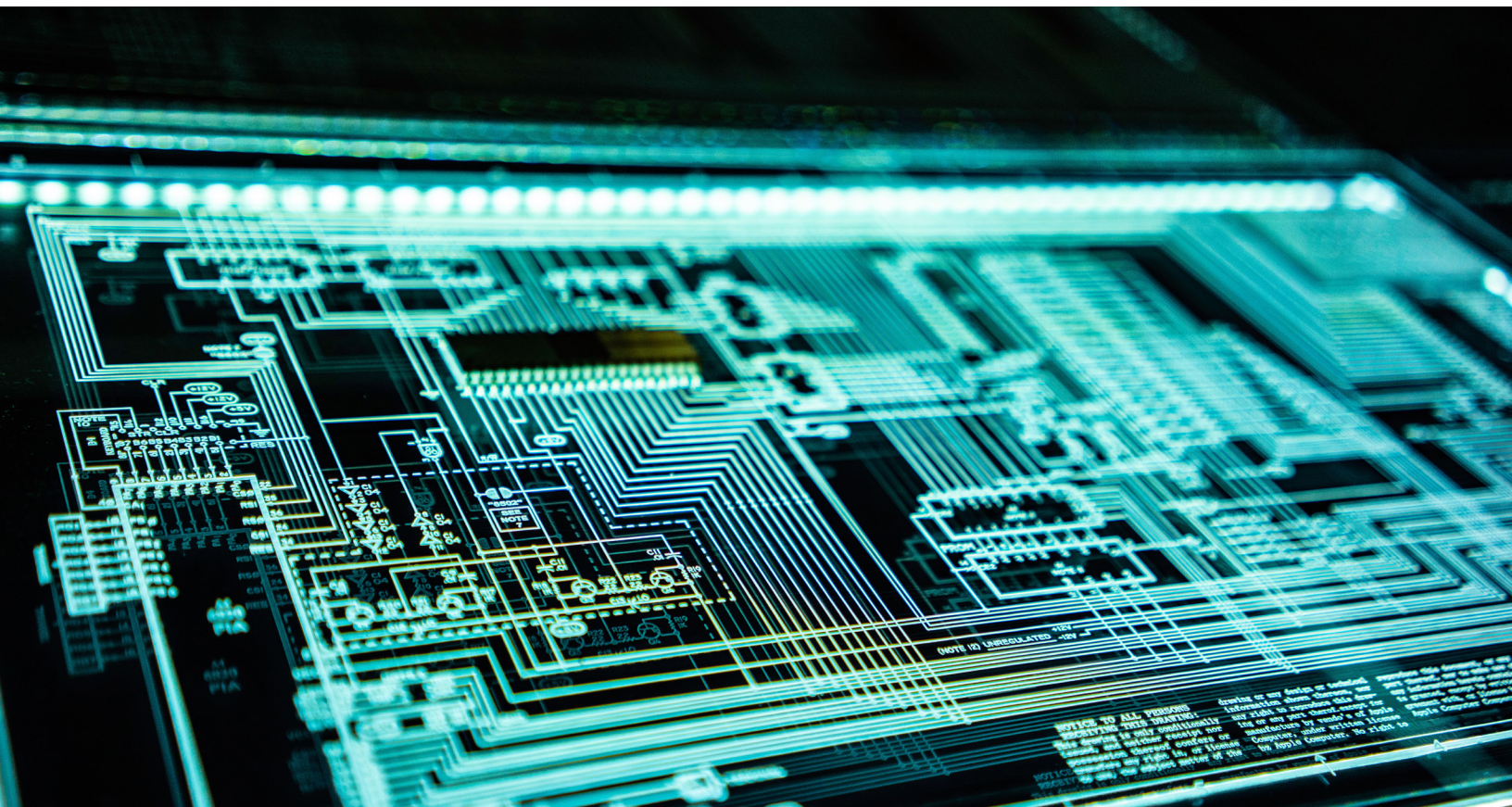
An alternative to performing updates and patches on premises is to use a cloud service provider that offers strong security features and is responsible for administrative tasks.



How Can Citrix Help

In the past, cyberattacks on a hospital or health system were easier to defend against because applications and data were located in the data center and protected by firewalls and other perimeter security. Now that applications and data are increasingly hosted in public and private clouds and accessed by mobile and remote users, the traditional physical perimeter no longer exists.

Unlike a traditional VPN, Citrix Secure Workspace Access provides a zero trust approach to securely access corporate web, SaaS, and virtual applications. With advanced security controls for managed, unmanaged, and BYO devices, it's ideal for IT and employees alike.



How Citrix Helps Hospitals and Health Systems

Citrix solutions for hospitals and health systems address challenges around data security, remote access, cost control and user experience. This is a key reason why 100% of the top 10 largest healthcare organizations in the United States use Citrix IT solutions.

Citrix Workspace helps to thwart attacks on Protected Health Information (PHI). Applications and data reside securely in the corporate datacenter or cloud instead of being exposed to loss and theft on endpoint devices. Further, Citrix networking solutions reduce the attack surface by consolidating access points with granular access control policies, including support for nFactor authentication to assist with regulatory compliance. With Citrix SDWAN solutions, hospitals can connect remote locations without the need to deploy VPNs or stand up additional equipment.

Citrix solutions improve clinical workflows by enabling clinicians to access EHR data and other sensitive patient information on any mobile device, over any network, with a consistent, high-performance experience. For optimal efficiency, apps and data securely follow clinicians as they roam from location to location.

In regard to cloud services, Citrix is vendor- and device agnostic, giving hospitals and health systems the flexibility to choose the solution that works best for their situation.

In short, Citrix workspace and cloud solutions support digital transformation for hospitals and health systems. These solutions facilitate the delivery of high-quality, value-based care for better patient outcomes while improving clinician efficiency and experience, reducing complexity for IT administrators, safeguarding confidential data, strengthening workspace security with zero trust access and single sign-on, and lowering operational costs.

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