

VMware in Healthcare

Transforming the Cost, Quality and
Delivery of Patient Care



“Our vision is to provide a completely connected and collaborative care environment—where patients have real-time, secure access to their health records, physicians and nurses have clinical applications at their fingertips, and payer interactions are seamless. Today, VMware is helping us to achieve this vision with solutions that significantly decrease the cost of patient care, while raising quality and streamlining delivery.”

William Lewkowski, CHCIO

Executive VP / Chief Information Officer

Metro Health Corporation

Enabling Healthcare IT Transformation

HEALTHCARE IT

“Better healthcare requires a transformation of healthcare IT that begins with the implementation of meaningful use solutions—electronic health records (EHRs), computerized physician order entry (CPOE), eprescribing, and health information exchange (HIE)—to automate and connect healthcare applications and processes across the care community. To gain the full benefits of these solutions and drive even greater agility, providers should be investing in flexible and cost-efficient infrastructure and application platforms that provide a strategic approach to a truly automated and connected environment.”

Scott Lundstrom
Group Vice President
IDC Health Insights



Healthcare is experiencing a historical transformation. Providers, insurers and life sciences companies are all focused on patients, yet each faces unique challenges—from meeting reform mandates to controlling premiums to accelerating development—when it comes to improving the cost, quality and delivery of patient care. For providers, the heart and lifeblood enabling transformation is healthcare IT.

“What our clinicians know is that now technology is an enabler, an integral part of care delivery. Making it easier to process information allows them to focus more directly on patient care,” explains Ryan D. Winn, vice president and CIO of MidMichigan Health.¹

Investment Priorities

Every healthcare provider is committed to delivering the highest quality patient care. In the U.S. and around the world, providers are making record investments to modernize legacy IT infrastructure and clinical applications to enable connected care. While changes are necessary to meet regulatory requirements in the U.S., including the Health Insurance Portability and Accountability Act (HIPAA), and to receive incentives from the American Recovery and Reinvestment Act’s (ARRA’s) Health Information Technology for Economic and Clinical Health (HITECH) provision, providers are also investing in healthcare IT to:

- Cost effectively deliver more and better patient care to an aging population.
- Integrate disparate systems and accelerate economies of scale resulting from industry consolidation.
- Support the next generation of consumers and caregivers who expect access to information and interactions with providers to be continuous, seamless and electronic.
- Tighten information security.
- Attract and retain the most talented healthcare workforce.

Why VMware?

As the leader in virtualization and cloud infrastructure, VMware delivers trusted solutions that enable providers to improve the cost, quality and delivery of patient care by consolidating existing datacenters, enabling mobile clinician access to electronic medical records (EMRs), securing sensitive patient information, and delivering robust patient-care applications and services. For healthcare providers of all sizes, VMware solutions change fragmented, legacy IT systems into agile computing environments, which in turn accelerate quality connected care.



GREATER HUDSON VALLEY HEALTH SYSTEM

“Virtualization saves lives. VMware infrastructure gives us the confidence to change workflows and processes; to make things better and faster, so that the access and delivery of healthcare becomes better. We have met all of the qualifications for meaningful use, and I’m excited about our private cloud. It provides secure access to patient records when doctors and healthcare providers need to make a critical decision about someone’s health.”

Dr. Shafiq Rab
Vice President & Chief Information Officer
Greater Hudson Valley Health System

The VMware Approach

VMware eases the transition from paper-based to electronic systems for integrated delivery networks, community hospitals, clinics and public health organizations while modernizing and preserving existing IT infrastructure and application investments. With proven virtualization and cloud solutions, VMware enables healthcare providers to reduce IT cost and complexity while improving service quality and delivery.

By increasing flexibility and enhancing end-to-end information security, VMware solutions help providers meet and exceed regulatory requirements and adopt new technologies, including electronic health records (EHRs), quickly, successfully and safely. VMware solutions ensure that clinical care applications are highly available and highly reliable so that patients and clinicians have always-on, always-accessible applications and services.

With virtualization as the foundation, VMware enables you to build your healthcare cloud—the right private, public and hybrid cloud model to meet your unique business needs. In partnership with the world’s leading EMR and imaging companies, VMware brings the power of cloud computing to healthcare. VMware partnerships and joint solutions empower healthcare IT to deploy virtualization to increase agility and clinician mobility and workflows while improving overall compliance, privacy and security. New systems can be rapidly and securely implemented on robust virtualized platforms or via an infrastructure-as-a service (IaaS) or software-as-a-service (SaaS) model. VMware accelerates the journey to IT as a service, making providers more responsive and efficient.

Based on open standards, VMware solutions are widely supported by leading hardware and software vendors. They offer healthcare providers and healthcare application vendors, such as Allscripts, Cerner, DR Systems, Epic, Fujifilm Medical, McKesson, MEDITECH, Siemens and Vital Images, the greatest freedom of choice to deploy applications and services in the most cost-effective model.

Healthcare IT Transformation

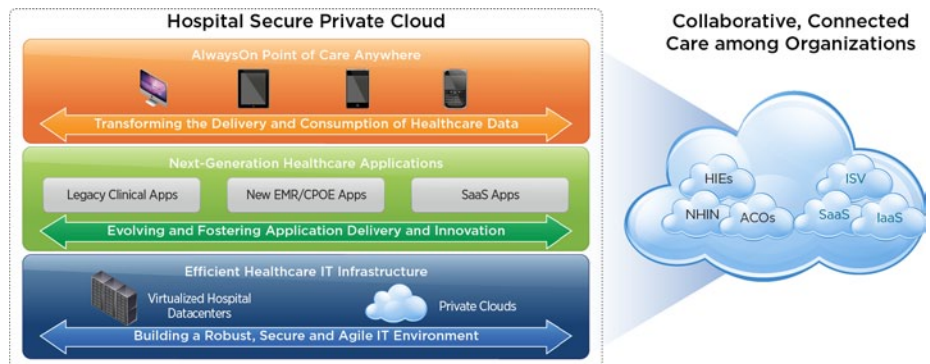


Figure 1: VMware provides solutions that transform the cost, quality and delivery of patient care.

Reduce Costs to Foster Innovation

Healthcare costs are skyrocketing, in part because healthcare systems and processes have not been able to easily adapt to changing realities. To meet growing clinician and patient demands for new services and applications, over the years providers have added servers and datacenters organically and through acquisitions. However, many of these fragmented computing silos have led to server and application sprawl, making IT infrastructure and services more difficult to manage and costly to maintain. With greater need than ever to address compliance mandates and improve efficiency while reducing costs, healthcare providers are turning to server consolidation and intelligent virtual infrastructure.

Virtualization First, Then the Cloud

Server consolidation through virtualization is a critical step to cloud computing. Virtualization is the foundation for the cloud because it removes the dependencies between software and the hardware that runs it. The decoupling enables IT to turn underutilized infrastructure into an elastic, resilient, partitioned and secure pool of compute resources available to caregivers on demand. With a simple 2:1 server consolidation effort, providers can reduce the number of physical x86 servers by half and achieve significant cost savings while maintaining service quality. Their savings potential, however, is much greater, considering that VMware customers achieve average consolidation ratios of 12:1, with many attaining higher rates. VMware dramatically lowers capital expenses, freeing budget for additional patient-care systems and clinician tools.

Today, healthcare providers are using VMware infrastructure to reduce datacenter and capital costs, decrease time spent on routine administrative tasks, and cut datacenter energy costs—all without sacrificing compute performance, availability and uptime. Additionally, providers benefit from the close working relationships VMware maintains with leading healthcare ISVs. Together, they ensure that EMRs, medical and document imaging (PACS/RIS), contract management, and other critical patient-care applications run efficiently and effectively in virtual and cloud environments.

The Foundation for Your Healthcare Cloud

Intelligent virtual infrastructure is highly adaptive and easily scales to meet provider needs. It leverages VMware vSphere®, the industry's leading virtualization platform, to deliver consistent security, management and service quality regardless of where workloads run—in a private cloud, in a VMware enabled public cloud or in a hybrid cloud. Leveraging VMware infrastructure, healthcare providers can run patient-critical applications with confidence by eliminating downtime and reducing TCO. Providers can deliver high-quality service and reduce operational expenses with automation and intelligent policy management. Disaster recovery, business continuity and end-to-end security and compliance features reduce the cost of EHRs and the threat of breaches, enabling providers to achieve meaningful use faster so that they can qualify for financial incentives.

BETH ISRAEL DEACONESS MEDICAL CENTER

"By delivering secure, electronic health record applications via a private cloud to physicians, we've helped deliver on the vision of a healthcare system that puts the needs and values of the patient first, and gives patients and medical professionals the information they need to make clinical and economic decisions. VMware gives us the flexibility, scalability, and cost savings needed to make this a reality."²

Bill Gillis
eHealth Technical Director
Beth Israel Deaconess Medical Center

Agile

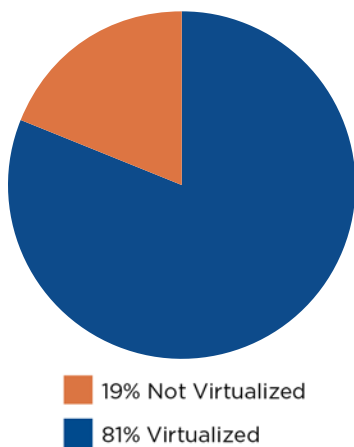
"Sixty percent of respondents perceived that cost savings would be the greatest benefit of cloud computing, particularly because they would avoid additional onsite storage and network infrastructure costs, including the ongoing maintenance costs, labor costs, and hardware costs... One-third of respondents—particularly standalone facilities—said that the next greatest benefit was availability, security, and disaster recovery."

KLAS
"Path to Cloud Computing Foggy: Perception Study 2011,"
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Enhance Quality to Improve Patient Outcomes

In healthcare, quality is measured by outcome. Did the patient receive the right diagnosis and the right care, quickly and safely? Is the patient's record secure? To provide the highest quality care in today's rapidly changing healthcare climate, providers can leverage virtualization and cloud computing to meet new uptime, security and availability requirements. VMware solutions enable healthcare providers to modernize legacy clinical IT environments to deliver the optimal capacity and performance required for high-quality patient care. They reduce the costs and risks associated with disaster recovery and system downtime, and ensure that IT and clinical applications are secure and always available.

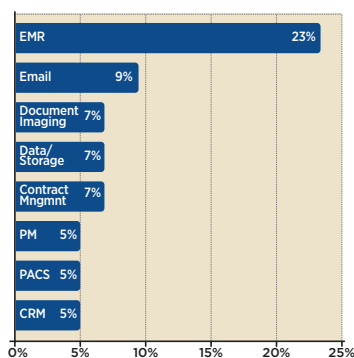
Are Any Environments Virtualized?



Robust Care Infrastructure

Hospitals are in business to save lives. To do so, clinicians must have continuous access—with no downtime—to critical applications and services. With VMware, providers can improve availability and continuity of care using vSphere, which includes built-in intelligence with high availability, fault tolerance, dynamic resource scheduling and disaster recovery capabilities. These rapid and reliable features minimize risk by enabling clinical applications to receive the resources they require with the availability that critical patient-care systems demand. In healthcare, where speed can save a life, VMware solutions can ensure that critical patient systems are performing at or above service-level agreements (SLAs) and that operations experience zero downtime.

Cloud Solutions Most Commonly in Use



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This research shows the majority of healthcare companies interviewed for the study have embraced virtualization and EMRs top the list of most common applications in the cloud, notes VMware.

At the same time, providers must plan for worst-case scenarios. When hurricanes or tornados cause devastation or an electrical grid fails, hospitals with patient-care continuity plans can quickly recover operations. VMware solutions automate disaster recovery plans and test them in a nondisruptive manner. The solutions enable healthcare IT teams to better protect data by using virtualization to simplify backup and recovery processes, and when necessary, easily reinstate entire systems within recovery time objectives using existing backup tools and methodologies.

VMware solutions enable providers to deliver continuous patient care by eliminating planned downtime and service disruption for maintenance, protecting against unplanned downtime from common failures, and reducing the time of failures when natural and other disasters strike. VMware solutions also provide healthcare IT with a trusted and dynamic environment to support emergency management programs, such as the Joint Commission's Emergency Management Standards.

AlwaysOn Point of Care

High-quality patient care presupposes that clinicians have the most up-to-date data and applications, when and where they need them. Clinicians have location-aware, anytime, anywhere access to patient data with the VMware AlwaysOn Point of Care solution. The AlwaysOn solution includes centralized control of desktops and mobile devices, allowing IT

teams to set policies that determine information access and application privileges based on a single user or a group of users.

The AlwaysOn solution is built on the industry-leading desktop virtualization platform, VMware View™. Providers leverage a critical component of VMware View to host desktops and applications in the datacenter. The solution gives providers unparalleled reliability with features that continually monitor, load-balance and dynamically allocate resources across the desktop environment, enabling IT teams to deliver a nonstop point-of-care desktop with all applications and data readily available. VMware View virtualizes Windows XP and Windows 7 desktops and runs them on secure servers in the datacenter, delivering them with the speed of a local device.

Comprehensive Security and Compliance Frameworks

Patient privacy and security has always been of paramount concern for healthcare providers. Only recently, however, has the U.S. Department of Health and Human Services (HHS) been enforcing HIPAA violations, and the financial penalties and brand damage resulting from major security breaches are significant. In 2011, HHS issued a \$4.3 million fine following a provider's inability to provide patients with copies of their records.³ The HHS Web site details several hundred HIPAA security violations that affected individuals. In the recent KLAS Perception Study, 64 percent of responding providers (are) leaning toward using a private cloud over a public cloud, citing security concerns.⁴

VMware solutions enable healthcare organizations to secure virtual datacenters and cloud environments at all levels—host, network, application, data and endpoint. They support endpoint personal health information (PHI) compliance because no sensitive data is left or stored on PCs or laptops, which can easily be stolen. VMware solutions enable auditability and accountability, providing tracking and auditing mechanisms to determine who has accessed devices and PHI in the cloud. Single sign-on (SSO) integration adds another layer of protection, using username and password or biometric authentication to control access to clinical workspaces and patient-care applications.

To support healthcare cloud governance, VMware solutions continuously assess virtual and physical IT environments so providers can comply with corporate standards, best practices and regulatory mandates. With VMware, providers can stop chasing compliance. They get powerful and automated remediation of noncompliant configurations.

Comprehensive security and compliance management solutions from VMware feature adaptive, cost-effective and industry-specific security services within a single management framework to better protect patient privacy, secure IT systems and meet compliance requirements. They enable more mobile and dynamic healthcare in a trusted cloud infrastructure from clinical, point-of-care desktops to hospital datacenters, and healthcare providers can achieve meaningful use faster while preventing publicized, brand-damaging security breaches.

ARCARE

"Security is very important. Being in healthcare, we want to make sure that we have no information whatsoever residing on the local machine. With VMware, our Security Department gets to manage security in the way they need to, and at the same time, our policies are kept up in place, and also our responsibilities with HIPAA and the federal regulations are completely in compliance as well."

Greg Wolverton
Chief Information Officer
ARcare

Trusted

The VMware ecosystem includes 2,200+ technology and consulting partners, 25,000+ channel partners, 70+ VMware vCloud™ Service Providers, and 59,000+ VMware Certified Professionals.



**MCCULLOUGH HYDE
MEMORIAL HOSPITAL**

"I have become accustomed to using my laptop for almost all of my patient care interactions. I am able to look at X-rays, pull up lab work, do all of my charting and also to access other parts of a medical record remotely, which is extremely convenient when I'm working with patients at our clinic, onsite at an employer or at the hospital... VMware technology really does improve patient care because it makes us more efficient."⁵

Dr . Kenneth Keller
Director, Occupational Health
McCullough Hyde Memorial Hospital

Journey to Connected Care

Patient care happens everywhere—bedsides, remote offices, homes, labs and in the cloud. These varied locations require providers to manage a variety of unique desktop environments, ranging from workstations on wheels to high-traffic nursing stations to inpatient room computers. To improve the delivery of care, healthcare IT teams are looking to virtualization and cloud computing to help them more efficiently manage and update desktops and applications, provide a highly available point-of-care solution for clinicians, and maintain security without compromising clinician mobility.

Seeking to free healthcare IT from more than two decades of complex, device-centric computing, VMware delivers a more user-centric, higher quality on-demand experience for connected care infrastructure. In this new model, healthcare providers leverage hybrid cloud resources, while maintaining a managed, secure environment. VMware enables new ways for clinicians to collaborate across applications and data from any device, where and when they need it. With more clinicians and healthcare consumers using their applications and services, healthcare providers are able to deliver better services at lower costs.

At the Point of Care

VMware offers a reliable, secure and validated platform for the mobile delivery of patient-care applications in a variety of inpatient and outpatient clinical settings. The VMware AlwaysOn Point of Care solution provides simple, secure access to clinical workspaces, giving clinicians increased mobility and performance, and a better overall experience. Clinicians gain a rich desktop experience that they can access as easily from tablets as from conventional PCs. The managed desktop-as-a-service solution also significantly decreases the possible exposure of PHI and other sensitive information to theft, thus increasing HIPAA compliance. Available today on mobile phones and mobile hypervisors, new VMware solutions enable providers to establish and securely manage a clinician's connected mobile workspace in isolation from their personal mobile environment.

VMware Point of Care



Figure 2: VMware solutions provide clinicians with highly available, mobile access to critical patient-care applications, information and images—at bedsides, in offices, in labs and at home.

Improving Workflows and Clinician Experiences

VMware solves the challenge of delivering inpatient and ambulatory EMR/CPOE systems to clinicians by providing a positive user experience. Its solutions support patient data entry across a range of platforms and devices, increasing clinician mobility and workflow use.

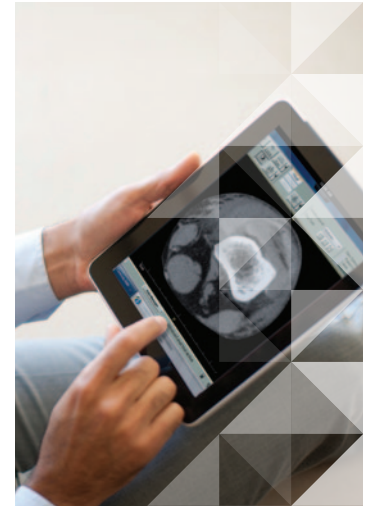
VMware View integration with leading third-party SSO solutions provides rapid authentication for doctors, nurses and other caregivers in their clinical workspace. With just the touch of a finger or the tap of a badge, clinicians can quickly access patient-care applications and data from anywhere without entering multiple passwords. As a user moves between workstations, PCs and thin or zero clients, the desktop follows the caregiver, preserving the desktop session in state and eliminating the need to restart each application along the way. With these capabilities, IT streamlines clinician workflows and access to patient information. At the same time, IT eliminates password-related frustration and delivers electronic information to clinicians wherever they are, helping to speed EMR adoption

VMware View also leverages the groundbreaking Teradici PCoIP display protocol to provide the richest clinical desktop experience available. A completely lossless protocol, PCoIP is designed to deliver high-end graphics and files over a local area network (LAN) or wide area network (WAN), making VMware View an ideal solution for viewing clinical images. For example, VMware View enables referential imaging for accessing and reading medical imaging data that has been uploaded or rendered in the cloud. With this technology, rural health clinics and remote radiologists can collaborate by taking advantage of mobile access to medical images.

Partnering for Success

VMware is transforming how healthcare application ISVs deliver clinical applications and services to healthcare providers. From more flexible and efficient hospital datacenters to EHR and imaging solutions delivered onsite or through the cloud, VMware is empowering ISVs to build more robust solutions that increase capabilities, reduce costs for providers, and improve patient-care. VMware is also working closely with ISVs to usher in the next generation of healthcare applications, built specifically for the cloud, where information and data reside independently and are always accessible to patients and caregivers.

The large VMware ecosystem includes more than 25,000 partners—many of which are the world's leading clinical application vendors. Together, ISVs and VMware deliver more reliable, available, high-quality and secure systems to healthcare IT. For example, at Palo Alto Medical Foundation, VMware Professional Services and ISV Alliance teams helped a healthcare technology leader virtualize to control datacenter growth, deliver \$3+ million ROI in just three years, and deliver high availability in Tier 1 clinical applications—without missing a beat.⁶ ISV partnerships providing built-in support have also made the VMware AlwaysOn Point of Care solution the best way to deliver patient-care applications such as EMRs and CPOE anytime, anywhere.



Flexible

“VMware is charting a journey for customers towards a comprehensive, user-centric desktop and application management strategy. VMware Horizon™ is a great example of how the company is enacting this vision—centralizing identity and access management today as the broker for Software-as-a-Service, legacy and mobile applications, and in the future for other application types and enterprise data.”

Mark Bowker
Senior Analyst
Enterprise Strategy Group.



WHY VMWARE?

Reduce IT complexity and costs while preserving existing IT investments.

Enable the mobile delivery of patient-care applications in clinical settings.

Meet and exceed corporate standards, best practices and regulatory mandates.

Improve IT performance and ensure nonstop application availability.

Deliver fully supported and validated applications and cloud services.

Team with VMware to Transform Healthcare IT

Healthcare is accelerating toward a future of more collaborative, expanded patient-centered care. VMware is committed to empowering patients, caregivers and researchers with the resources to cost-effectively connect care across the world. With VMware solutions, providers gain the IT and business agility to deliver better and more affordable care to everyone.

VMware transforms healthcare IT with trusted solutions that improve the cost, quality and delivery of patient care while modernizing and extending existing IT investments. VMware works closely with the world's leading healthcare ISVs to deliver reliable, always-available applications and services that accelerate connected care. Trusted VMware virtual and cloud computing solutions enable healthcare IT organizations to meet strategic goals, including complying with healthcare reform, such as the HITECH Act, and improving patient care through the deployment of EMRs, email, medical and document imaging (PACS/RIS), data/storage, contract management, and other applications in the cloud.

Today, more than 250,000 customers worldwide rely on VMware solutions to reduce capital and operating costs and to increase control over IT infrastructures. These customers include leading regional, community, university, government and rural hospitals, clinics and labs. For these providers, virtualization and cloud computing are enabling significant benefits beyond cost savings and compliance. VMware solutions are helping providers achieve greater agility, increased efficiency, faster application development and deployment, and decreased datacenter real estate, power and energy consumption. By empowering both healthcare providers and ISVs with cloud infrastructure, VMware is also ensuring secure interoperability between private and public clouds—bringing all of the benefits of an enterprise hybrid cloud approach.

VMware award-winning solutions have transformed IT for healthcare providers for more than a decade. VMware provides an evolutionary and pragmatic path to the cloud based on the industry's most widely used virtualization platform. VMware solutions are complete and completely flexible, so that you can build the most important cloud in the world.

Your Cloud. Accelerate Healthcare IT. Accelerate Connected Care.

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- 1 VMware Case Study. "Health System Improves Efficiency, Clinician Experience, Face Time with Patients by Virtualizing Desktops." 2011.
 - 2 VMware Case Study. "The Beth Israel Deaconess Physician Organization (BIDPO) Provides Medical Management Services in Support of Its 1,500 Member Physician Practices Throughout Eastern Massachusetts," 2010.
 - 3 Government Health IT. "HHS slaps \$4.3M fine for HIPAA privacy violations," February 24, 2011.
 - 4 KLAS. "Path to Cloud Computing Foggy: Perception Study 2011," Erik Westerlind, November 2011. © KLAS Enterprises, LLC. All rights reserved. www.KLASresearch.com
 - 5 VMware Video Case Study. "McCullough Hyde Memorial Hospital." 2011.
 - 6 VMware Case Study. "Palo Alto Medical Foundation." 2011.

Learn more

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