A Journey to Improved Healthcare: Enhancing the EHR with Virtual Patient Records

Applied Technology

Abstract

This white paper summarizes the challenges of information management in healthcare. It then examines the components and capabilities of a virtual patient records platform, focusing on its value to admissions, patient financial services, and patient care.

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# Table of Contents

**Executive summary** ......................................................................................................................... 4  
**Introduction** ..................................................................................................................................... 5  
  Audience .............................................................................................................................................. 5  
**Meeting the challenge of healthcare with improved information management** .............................................. 5  
  A definition of terms ............................................................................................................................... 6  
**The virtual patient record—a working model** ...................................................................................... 6  
**VPR use case—admissions** .................................................................................................................. 7  
  First-time admission ............................................................................................................................. 7  
  Re-admission ......................................................................................................................................... 8  
  Making the admissions process more efficient ....................................................................................... 8  
**VPR use case—patient financial services** ............................................................................................ 9  
  Reducing paper and streamlining processes in patient financial services .............................................. 9  
  Revenue cycle management .................................................................................................................. 10  
**VPR use case—patient care** .............................................................................................................. 10  
  More information at the point of care ................................................................................................. 10  
  Improved incident reporting ................................................................................................................ 11  
**The VPR platform in compliance and records management** ............................................................... 12  
  Healthcare organizations need sustainable compliance ....................................................................... 12  
**Conclusion** ......................................................................................................................................... 13
Executive summary

A perfect storm brews in healthcare. Technical advances across all medical disciplines can extend life expectancy and improve the quality of life for those with diseases thought hopeless only a decade ago. Innovative procedures and new drug therapies enter the market virtually every day. But this innovation and potential to heal come with a stiff price. The cost of healthcare rises every year—often by double digit percentage points.

Businesses that provide health benefits to employees face cost increases they can no longer absorb in the name of maintaining competitive employee incentive packages. Bottom-line considerations often force employers to pass these increases on to their workforce. At the same time, the difference between the actual cost of a procedure and the amount a health insurer will reimburse the provider may be thousands or even tens of thousands of dollars. Insurers are moving toward a patient-outcome-based or pay-for-performance reimbursement model. To survive, let alone compete successfully in this environment, healthcare providers must effectively balance care delivery with cost control. And part of this balancing act requires that hospitals and other care providers have access to patient outcome information. Gaining this capability is the driving force behind electronic health record (EHR) systems—also called electronic medical records (EMRs) or electronic patient records (EPRs).

Of course, healthcare is an information-intensive endeavor and healthcare providers face the same barriers to effective information management that confront other large organizations. There are multiple systems within a healthcare organization that provide information during the patient lifecycle: before service, during service, and after service. Virtually every functional area of a hospital or clinic can have its own system—admissions, surgery, radiology, laboratory, pharmacy, HR, and so forth. Yet, health information systems are typically organized around the function they support—X-ray, anesthesiology, surgery—not the patient they serve. These systems are also rarely integrated and only 30 to 50 percent of the information they create is stored in digital form. An EHR system certainly manages some of this information but nowhere near all of it. So the problem of siloed, hard-to-access digital information and scattered, poorly managed physical information plagues the healthcare provider just as it does the manufacturer, the telco, or the clicks-and-mortar retailer. Moreover, the volume and variety of this information is staggering:

- Contracts, claims, and invoices
- Physician referrals, admissions questionnaires, and patient consent forms
- Test results, incident reports, and consultation summaries
- Web pages, e-mail, and instant messages
- Audio, video, and picture archiving and computer system (PACS) images
- Enterprise application data, corporate records, and procedure manuals

Beyond its value to the organization, much of this information is regulated—by the Health Insurance Portability and Accountability Act (HIPAA) in the United States and similar regulations in other countries. Regulation, for all its benign intent, places additional burdens on information systems. For example, the HIPAA privacy rule, which took effect in April 2003, establishes regulations for the use and disclosure of protected health information (PHI). PHI is any information about health status, provision of healthcare, or payment for healthcare that can be linked to an individual. For a large healthcare organization, this can be an enormous amount of information.

What few healthcare organizations possess is a single, consolidated view of patient information—clinical and non-clinical—delivered by a platform that bridges the gap between disparate systems, enables regulated information to be managed via automated business rules, and effectively deals with paper, which will always be a part of organizational processes. EMC calls this platform the virtual patient record (VPR) platform. A VPR makes all of a healthcare provider’s unmanaged information available to those who need it via whatever interface supports an organization’s processes.

A VPR can also help healthcare providers face two of its most important information management challenges:

- Complying with privacy rules such as HIPAA
Extending the reach of electronic health records

At the same time, it can:

• Leverage existing IT infrastructure
• Increase user adoption and simplify ease of use
• Improve relationships with physicians

A VPR solution does not look to replace established systems. It is an adapter-based solution that complements and enhances industry-standard medical information systems that have very limited interoperability.

The core technology of a VPR platform is enterprise content management, which can deliver a variety of services across the medical information lifecycle: prior to, during, and after patient service. A VPR platform integrates traditional hard copy scanning and optical character recognition techniques with electronic forms to streamline the capture of supporting documents such as medical history questionnaires, patient consent forms, regulatory acknowledgements, and so forth. It provides process services such as workflow and automated information lifecycle management. Such a platform can enable flexible archiving and records management that supports adherence to organizational policies and compliance with regulatory requirements. And it delivers powerful security capabilities that authenticate the origin of content and protect it from unauthorized access and modifications.

Introduction

The remainder of this white paper will examine the components and capabilities of a VPR platform, focusing on three key areas:

• Admissions
• Patient financial services
• Patient care

Audience

This white paper is intended for the chief information officer, the director of health information management, nursing informatics personnel, and the chief financial officer of large to midsized healthcare providers and integrated delivery networks. It may also be of interest to anyone on the clinical side of such organizations who wants a better understanding of VPR technology and how it can improve the healthcare experience.

Meeting the challenge of healthcare with improved information management

All healthcare providers face challenges that improved information management can help address. Two of the most important are:

• **Complying with privacy rules.** Healthcare is one of the most regulated industries, not just in the U.S. but globally. Most European Union (EU) members, for example, have or are developing strict privacy laws that govern personal health information within the member state. Further, as broader regulations such as HIPAA and the EU’s Safe Harbor Privacy Guidelines become more stringent, institutions cannot afford to expose themselves to the legal risk of allowing unauthorized access to private information—or even more serious, a data breach.

  Compliance demands grow even more daunting as e-mail becomes an accepted method of communicating patient information. For example, to meet HIPAA’s privacy provisions, Blue Cross Blue Shield of Tennessee (BCBST) deployed an information rights management (IRM) solution that protects patient information exchanged via e-mail within its organization and with external business
associates and members. The solution secures e-mail by scanning and detecting protected health information (PHI) contained in outgoing e-mail. It then applies policies to those e-mails that control printing, copying, and forwarding.

- **Extending the reach of electronic health records.** Most healthcare organizations have some form of electronic health record (EHR). But in many cases, the EHR contains only 30 to 50 percent of patient information—either clinical or financial. The rest exists in varied forms and locations. A lot of it is paper—copies of insurance cards and driver’s licenses, signed consent forms, and non-staff physicians’ medical records. But a substantial amount remains locked in the proprietary “information silos” of electronic systems, such as surgery, radiology, pharmacy, or even e-mail, to which the EHR may not have access. These silos may contain various medical images that meet the Digital Imaging and Communications in Medicine (DICOM) standard but also non-standard types such as audio files, videos of psychiatric counseling sessions, and digital photos used for dermatology and reconstructive wound care.

Moreover, a study conducted by Harris Interactive for the Commonwealth Fund suggests that many patients would like to see doctors move to electronic health records, with many suggesting that EHRs would help improve care quality and coordination within the healthcare system. The study also found that nearly 90 percent of respondents want their doctors to be able to share data electronically with other practices or hospitals. Of course, this last finding simply adds more complexity to any privacy compliance effort.

By leveraging the scope and capacity of in-place medical information systems, a VPR can accomplish both objectives at the same time:

**Leverage existing IT infrastructure.** Very few organizations in any industry can afford to completely rebuild information systems from scratch. Healthcare providers are no exception. Hospitals, clinics, and other care providers need information management solutions that increase the return on IT investments already in place, simplify infrastructure complexity, and reduce total cost of ownership (TCO).

**Increase user adoption and simplify ease of use.** A VPR platform doesn’t require any specific application interface. It can be accessed through system interfaces already in place, via a web-based interface, or through common productivity applications such as Microsoft Office.

**A definition of terms**

There is no industry standard for what an EMR, EHR, or EPR includes. By and large, the terms are used interchangeably. Some organizations—but by no means a majority—make the following distinction: An EMR contains strictly clinical information such as medical charts, ICU flow sheets, physician and anesthesia records, surgical reports, prescribed medications, discharge summaries, wellness care program descriptions, and so forth. The EPR encompasses non-clinical information such as insurance coverage and other financial data. The EHR consolidates this information into a single, global view of the patient.

The more salient point to understand is that regardless of what an organization calls its electronic record system, and no matter what it contains, plenty of information—clinical and otherwise—exists outside that system. And that information is the province of the VPR. For the sake of simplifying terminology, in the remainder of this white paper, an EHR will stand in as well for EMRs and EPRs.

Today, most healthcare organizations have one or more EHR systems or they’ve allocated resources to develop them. A VPR can be a vital adjunct to any EHR. It can provide a central repository for all unstructured content and a unified, patient-centric view of information that streamlines clinical and administrative processes. Moreover, a VPR can make this view accessible through the familiar interface of any EHR system.

**The virtual patient record—a working model**

A VPR solution does not look to replace established systems such as McKesson, EPIC, PICIS, GE, PeopleSoft, and others. It is an adapter-based solution that complements and enhances industry-standard
medical information systems that have very limited capabilities with unstructured content. Deploying a VPR is also not an “all or nothing” IT decision. It is designed for modular deployment. The most practical starting point is determined by the current state of information management within an organization and by its most pressing requirements.

The core technology of a VPR platform is enterprise content management, which can deliver a variety of services across the medical information lifecycle: prior to, during, and after patient service. The centerpiece of this platform is a common repository where digital content can be stored and made available to existing systems and applications. It can store and manage content in virtually any format including medical images, standard productivity and enterprise application data, and rich-media files.

A VPR platform integrates fax input and traditional hard copy scanning—enhanced by optical character recognition techniques—with electronic forms to streamline the capture of supporting documents such as medical history questionnaires, patient consent forms, test and procedure requests, regulatory acknowledgements, proof of insurance, and so forth. It features a unified content repository that can store and manage electronic content in virtually any format. The platform includes process services such as workflow and automated information lifecycle management. It enables flexible archiving and records management that supports adherence to organizational policies and compliance with regulatory requirements. And the platform’s powerful security capabilities enforce content authentication and protect information from unauthorized access and modifications.

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Figure 1. Diagram of virtual patient records

**VPR use case—admissions**

A large proportion of the information healthcare organizations deal with either comes in through admissions or is created there. There are two typical admissions scenarios: a patient is admitted to a hospital, emergency department, or clinic for the first time; or a patient is re-admitted.

**First-time admission**

During the intake process, patients provide a variety of information to the admitting nurse or clerk. This information will include:
• Name and address—Given verbally and keyed into an electronic form or provided as part of a hardcopy patient pre-admission form completed and signed by the patient or patient’s guardian
• Proof of insurance—Usually a card that is copied
• Picture identification—Often a driver’s license that is copied

They also sign numerous forms such as:

• Authorization to release protected information
• Consent for treatment and conditions for admission
• Acknowledgement of HIPAA privacy notices
• Advance beneficiary notice and advance directives
• General medical admission

In fact, in most hospitals and clinics there is often not one admissions process but several as a patient passes from general admitting to the various departments that will deliver his or her care. So information is not generated from one point but many. Gathering this information is still a paper-intensive process. Even when forms are available electronically, many are printed and filled in by hand. Anything the patient signs has to be printed as well.

The end result is a lot of information on paper. Generally, the information is duplicated and physically exchanged—from admitting to surgery, surgery to anesthesia, anesthesia to cardiology, and so on—a literal “paper chase.” Often, the same data is entered again and again into multiple systems, which frequently results in delays, errors, and lost documents.

**Re-admission**

Hospitals vary in how long they keep medical records active, but the period usually ranges from 12 to 24 months after a patient’s most recent procedure. At the end of that period, paper components of the medical record are often stored offsite.

If that’s the case when a patient needs to be re-admitted, paper records must retrieved, transported, and re-integrated with current information. At the very least, this is costly and time consuming. In a medical emergency, it could be life threatening. Several physicians may need to review multiple sources to establish a patient’s history and to catch issues relevant to the current situation.

**Making the admissions process more efficient**

Theoretically, a VPR platform can be initially deployed in any clinical or business area. But it can have an immediate and dramatic impact in admissions where the flow of information begins from inpatient and outpatient departments, the ER, and offsite clinics. The first step in deployment typically focuses on reducing paper through electronic capture, which can cut process time in clinical and non-clinical areas by up to 90 percent. Electronic capture eliminates paper at the point of origin through intelligent electronic forms. These forms eliminate rekeying and can automatically validate information against external systems and databases. They can also be designed to dynamically modify available options and choices as the form is completed.

Document scanning copes with the paper an organization already has. Through document scanning a VPR platform enables all incoming paper documents to be captured directly into a central repository. This reduces the incidence of lost documents, eliminates photocopying, and decreases the need for offsite document storage.

During document scanning (or fax input), machine printed text, handwritten text, and optical characters such as checkboxes are recognized. This ensures that documents are automatically identified by type and indexed for efficient search. Image quality is enhanced and data extracted that can be delivered to other systems. As with electronic forms, indexed data can be validated against third-party systems. Once data is released to the repository, extracted metadata creates an HL7 (healthcare interface language) message that
is routed via an interface engine to various departmental information systems, such as traumatology, surgery, radiology, or internal medicine. Hyperlinks enable users of these systems to click on a medical record and view the supporting document images.

This capture technology, which is ideal for admissions, can be leveraged throughout an organization in central and distributed environments including:

- Dedicated capture from central and remote locations
- High volume capture from doctor offices, hospitals, and clinics
- Low volume, ad hoc scanning from desktops, network scanners, and multi-function peripherals

Extracted data can trigger workflows that integrate with clinical and operational systems. For example, data from the initial patient assessment form can launch a workflow that routes food or medication allergy information to nursing care. The workflow can also ensure that the proper procedures are followed to avoid adverse reactions to food or drugs. Once the foundation for this integration between the VPR platform and other systems is in place, the potential for value added services to a healthcare organization substantially increases.

**VPR use case—patient financial services**

Managing the financial processes for a healthcare organization includes transactions with patients, individual physicians, private insurance companies, Medicare, nursing agencies, laboratories, and more. It is a complex endeavor for a variety of reasons.

**Clinical processes are disconnected from financial processes.** When a procedure is completed or a patient is released, the finance group may not be notified until it receives paper documentation. With so much paper to deal with, it may take staff a long time to correlate payees with payers, increasing the time before a healthcare provider can receive payment and delaying payments to vendors. Moreover, most contracts with insurers specify a maximum time that may elapse between performing a service and submitting an invoice. A lengthy delay could void an insurer’s obligation to pay.

**Payment disputes require time-consuming audits.** When insurance companies dispute a payment claim, it must be substantiated with invoices from the medical product and service providers. These documents likely arrive at different times from multiple sources, which makes it difficult and time consuming to locate them. If the claim is small (for example, under $250), it may be more cost-effective to write it off rather than expend the resources required to justify the claim.

**Patients have a legal right to their clinical and financial medical records.** Nevertheless, providing that access in a timely manner is inhibited by the same barriers that make it difficult to manage payables and receivables efficiently and substantiate claims—a lot of information dispersed throughout the organization and much of it paper.

**Reducing paper and streamlining processes in patient financial services**

By capturing financial information electronically through scanning paper documents, finance departments can more quickly locate and aggregate the information they need to manage payables and receivables, support audits, and make financial information available to patients through online channels. With document indexing the digital image of any document—proof of insurance, explanation of benefits (EOB), invoice, and so forth—can be accessed simply by searching for it via the patient ID. For example, scanning EOBs and managing them electronically can decrease average search and retrieval time by almost 90 percent. Reducing the volume of paper in patient financial services benefits the patient and the organization in numerous ways, including:

- Fewer billing errors and miscommunications
- Accelerated handling of insurance denials
- Faster response to inquiries and resolution of disputes
• Increased visibility into financial operations
• Improved cash flow through streamlined payment processing
• Reduced need for onsite and offsite physical document storage

Once digital images of financial documents are stored in the VPR repository, they can also be routed automatically through a department’s business processes via workflow, which can include rules for deadlines and escalations that ensure required procedures are followed. A good example of how the electronic capture and process efficiency of a VPR platform enhance patient financial services is revenue cycle management.

Revenue cycle management

According to Hospital Accounts Receivable Analysis (HARA)—a publication that summarizes statistical data related to hospital receivables—more than 10 percent of healthcare organizations’ claims are denied. These denials can stem from innocuous clerical mistakes at the beginning of the claims process such as incorrect patient information on registration forms or other administrative errors. Manual processes slow claims filing and increase errors.

A VPR can be integrated with existing clinical and patient financial systems to capture appropriate charges at the point of care. Claims editing tools ensure that claims are properly coded and are in accordance with applicable state Medicare and other third-party payer rules and regulations. Proper coding minimizes audit risk, reduces denials, and accelerates cash collections.

A claims denial can launch an automated workflow that is customized by denial code. For example, an administrative denial could be checked and corrected against a variety of data sources and automatically resubmitted. For more complicated clinical appeals, the VPR can aggregate relevant patient data, populate a work queue for a claims analyst, and apply work queue management policies to ensure the appeal is escalated and resolved within established parameters.

VPR use case—patient care

Effectively managing patient information is critical for any healthcare provider and the larger the organization, the harder the task. For example, a large medical center may have 1 million active patient files. And there may well be that many or more inactive files stored offsite. Of course, the cost and inefficiencies of paper come into play here, but what about the practical challenges of accessing and sharing medical records and their impact on patient care? In other words, beyond the greater efficiency effective information management can deliver to administrative personnel, how can it help clinicians in their day-to-day work of caring for patients?

A VPR platform can integrate data scattered across a variety of medical information systems, leverage whatever records schema has been developed for an organization’s EHR, and provide a level of support for clinical processes that cannot be matched by any single system. It can turn the EHR into a vastly improved working tool for clinical professionals.

More information at the point of care

Via links from any departmental system that contains treatment information for a patient, such as traumatology, internal medicine, or infectious diseases, a VPR consolidates patient data and makes it accessible through a single user interface—or “pane of glass.” The architecture for this type of VPR deployment may include:

• A clinical information repository
• Clinical modules containing information on protocols and guidelines
• Diagnostic modules for capturing lab and test results
• Complementary modules containing data such as dietary information and prescribed medications
Figure 2 shows how this information might be displayed by a clinical workstation.

Figure 2. On a single screen the VPR provides access to multiple information sources

Throughout a course of treatment, physicians can access a patient’s medical history through the VPR as well as request tests and view lab results, and input new information collected during examinations. With immediate access to information, clinicians can more efficiently and accurately deliver care to their patients. Errors are also reduced such as unnecessary tests or contraindicated treatments.

An important added benefit of the clinical repository is the potential it offers for advanced data mining to support research. Through a well-managed repository, clinical and epidemiological research teams can have access to literally millions of pages of data that might remain untapped. Improved research capabilities help healthcare organizations in their pursuit of grant funding.

**Improved incident reporting**

"More people die in a given year as a result of medical errors than from motor vehicle accidents (43,458), breast cancer (42,297), or AIDS (16,516)."\(^1\)

Incident reporting is a process in which occurrences that are inconsistent with routine facility operation or patient care are documented. Incident reports are generated for four types of medical errors: near misses, adverse events, intentional unsafe acts, and sentinel events. These events may affect any person on the premises, including patients, employees, physicians, visitors, students, or volunteers. Incident reports describe events that are unexpected, unusual, or out of the ordinary, whether or not they cause injury. Incident reports provide:

- The basis for a timely and comprehensive investigation of an incident, if necessary
- Insight to guide corrective or remedial action
- Raw data to identify risk trends for recurring issues and patient safety risks and to institute procedural changes or in-service training
- Information required for accreditation reviews conducted by The Joint Commission

Ideally, an incident report should contain all the information relevant to patient safety and be available to anyone who needs to see it. Nurses by far write the most incident reports. They are “on the ground” with patients 24x7. In many healthcare facilities, nurses handwrite an incident report, copy it, and physically distribute it—either in accordance with a policy or at their discretion. Certainly, a healthcare provider’s quality and safety department needs to see an incident report. But other potential recipients may vary depending on the type of event. Nurses are already very busy. Manual incident reporting simply adds to their workload and unfairly burdens them with a level of decision making for which they may not be equipped.

Through the use of intelligent electronic forms and automated workflow, a VPR platform can automate and improve incident reporting. Forms can be designed to require the input of all pertinent information, comply with organization policies and regulatory mandates, and trigger a workflow upon completion. Based on embedded business rules, workflow will route incident reports to the appropriate people and generate e-mail notifications if there is no response within a predetermined time. Figure 2 on page 11 shows a VPR platform can support automated incident reporting.

Moreover, since a VPR platform includes comprehensive audit capabilities, quality and safety staff can analyze and report on various aspects of the incident reporting process. Automated incident reporting helps ensure that incidents are addressed in a timely fashion, reduces liability risk, and demonstrates to insurance companies that healthcare organizations are effectively managing risk, which can lower premium costs.

The VPR platform in compliance and records management

Around the world, healthcare is one of the most regulated industries. Regulatory compliance involves adhering to and proving adherence to a specification, standard, or law that has been clearly defined. According to Forrester Research vice president Michael Rasmussen, “The U.S. government alone has released 114,000 new regulations since 1981.” Regulatory compliance is also a moving target; regulations are added and changed constantly.

For healthcare organizations, remaining compliant can seem like a zero sum endeavor. It’s expensive to deploy and maintain the comprehensive records management systems compliance may require. But to be found out of compliance carries daunting risks—sanctions, fines, loss of professional certifications, even suspended operations.

Healthcare organizations need sustainable compliance

Sustainable compliance balances risk with cost; it is sufficient but not excessive. Sustainable compliance relies on information policies that are comprehensive, automated, and repeatable. With the number of regulations that the contemporary healthcare organization faces, it is simply impracticable—not to mention very costly—to address each one individually. In other words, the same information infrastructure that ensures an organization meets the provisions of HIPAA or FDA 21 CFR Part 11 should enable it to comply with the EU’s Safe Harbor Privacy Guidelines.

A VPR platform makes sustained compliance achievable. First, it supports electronic capture across the organization. Electronic information is simply easier to manage and keep track of than paper. Second, the

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2 St Joseph’s Wayne Hospital, Administrative Policy and Procedure #66 (Wayne, N.J.: Saint Joseph’s Wayne Hospital, 2003) 1-5.
core of a VPR platform is a secure repository that can store and manage any type of digital content. In addition, a VPR platform features controlled content lifecycles, retention policy management, and storage resource management—three keys to sustainable compliance—that can ease the administrative burden of compliance-driven record keeping while reducing its cost. A VPR platform can ensure that regulated content resides in a protected repository, governed by retention policies that:

- Preserve information integrity and accessibility
- Enforce legal holds
- Prevent changes to or destruction of regulated content
- Provide complete audit trails
- Notify compliance managers as content moves through its lifecycle

The compliance capabilities of VPR platform can put the complexities of policy management behind the scenes and out of the hands of the users of information systems. For instance, in a file share environment, administrators can apply retention policies to folders. While completely transparent to the user, any document placed in the folder inherits the folder’s retention policy. Similarly, disposition can be handled automatically once content has lived up to its legal obligation or it can be done manually by administrators upon notification.

**Conclusion**

EMC and partners can deliver a VPR solution that enhances clinical, financial, and operational applications by capturing, managing, and providing electronic access to data that resides outside these systems. Healthcare organizations can leverage a VPR to streamline clinical and administrative processes and present a consolidated, patient-centric information view to departments across the enterprise. In conjunction with your electronic health record, the VPR can:

- Augment hospital information systems and electronic health record systems
- Capture, manage, and store patient-related documentation in a single repository
- Reduce the complexity of back-end storage environments and improve accessibility to clinical and administrative information.
- Provide a unified, patient-centric view of all enterprise-level patient and operational content
- Mitigate risk and liability with a platform that supports HIPAA compliance and accreditation reviews by The Joint Commission
- Enhance policy administration and enforcement and improve information security while providing a platform for collaboration and business process management

In spite of its power, the VPR solution is designed for modular deployment. For most healthcare organizations, the unified repository and integrated capture functions are the most practical starting points. There is also no need to rip and replace in-place infrastructure or applications. Of course, EMC and partners can create a custom solution interface if desired. But very often an organization has substantial investments in one of the healthcare market’s established systems. VPR access and functionality can be integrated with the interface of virtually any HIS.
Figure 3. The four stages of connected healthcare

To learn more about the EMC® Documentum® virtual patient record platform, please call us at (800) 607-9546 (outside the U.S.: +1.925.600.5802), contact your authorized EMC Documentum value-added reseller, or visit us online at www.EMC.com.

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