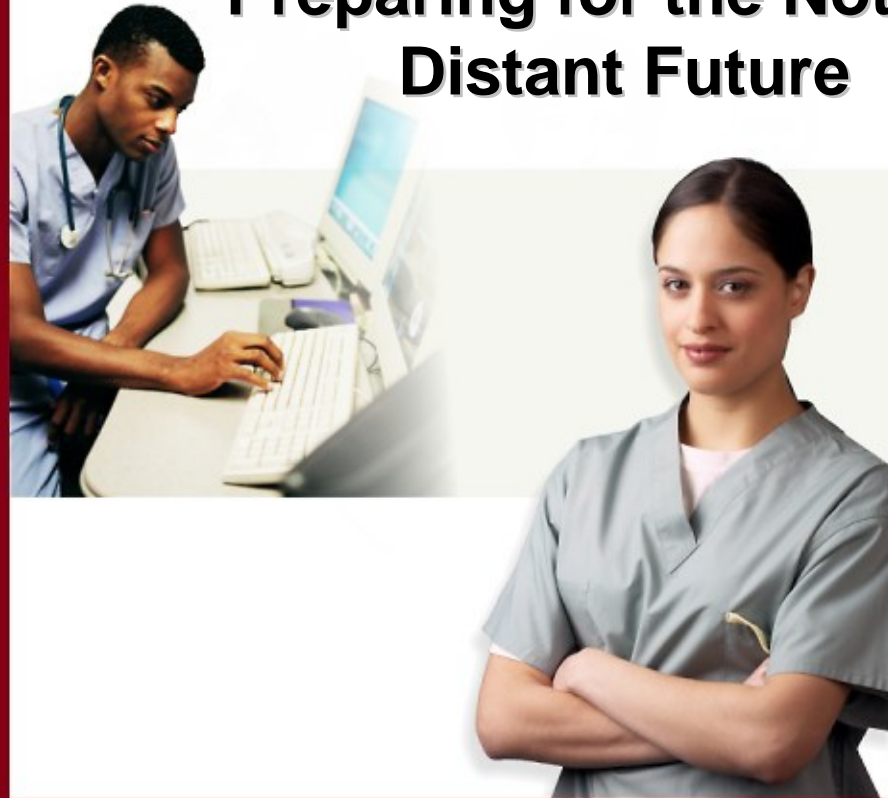




Next Generation Healthcare Delivery: Preparing for the Not-So- Distant Future



First Consulting Group, Inc.

April 2007



The Future: Overarching Themes



- While there will be market fads, some current trends are the future reality in health delivery.
- All institutions need to build for the future and do it right.
- IT will be a key to future success in health delivery but it must be affordable.

Preparing for the Not-Too-Distant Future: Clinical Care



Current Environment Challenges



Many problems plague the current health system.



Rising costs

Increasing demand

Regulatory requirements

Providers

Decreasing workforce

Patient safety expectations

Price pressures

The Four Truths



There are four truths that will shape the healthcare delivery system of the future.

Truth #1.

- **The expectation that care will be as safe as possible is not going away.**

Truth #2.

- **More patients, fewer providers plus cost pressures will force healthcare organizations to become more efficient.**

Truth #3.

- **Cost and quality transparency will be demanded by payers and consumers alike.**

Truth #4.

- **Reimbursement will create a three tier care delivery system.**

Truth #1: Safe Care



The expectation that care will be as safe as technically possible is not going away.

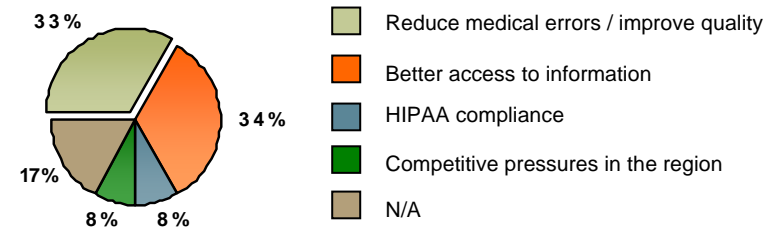
- **Safety and reduction in medical errors are now top executive and IT priorities.**
- **Public reporting will increase.**
- **Both patients and providers will expect that data will be readily shared across settings and be available at the point of care.**
 - Nearly one in three people say that they or a family member have created their own set of medical records (Agency for Healthcare Research and Quality, 2005)
- **Through the judicious use of clinical decision support, providers will be prompted to do the right thing – and thus prevented from making mistakes.**

Hospital executives are spending more time than ever addressing patient safety.

- According to a recent survey from the Health Management Academy, 64 percent of all executive groups (CEOs, CFOs, CMOs, and CNOs) rated patient safety as the top priority
- Forty six percent – including 18 percent of CEOs – spend more than 25 percent of their time on patient safety. (Source: Modern Healthcare, April 10, 2006)

Patient safety will continue to drive IT investments:

"If you expect your IT budget to grow in the next fiscal year, please indicate the ONE factor which is the main reason for this growth"



(Source: Health Data Management CIO survey, March 2006)

Bottom Line

Organizations need to consistently deliver safe, high-quality care and know as much about the patient as possible at the point of care. IT will be a major part of the solution.

Truth #2: Efficiency

More patients, fewer providers plus cost pressures will force healthcare organizations to become more efficient.

- **Delivery organizations will need to find new ways of delivering care.**
- **Tools that enable quality care to be provided in less time will be at a premium.**
- **Providers will need to find ways to enable less-skilled workers to safely perform tasks.**
- **Organizations will hire hospitalists to integrate consistency into the hospital system.**
- **With fewer clinicians, patients themselves will actually become the provider in more situations.**
 - New technologies make self-monitoring safe and effective for numerous disease states.

Digital glucometers for patients with diabetes, ***electronic scales*** for patients with CHF, and ***digital spirometers*** for asthma patients help patients track progress and detect early changes in the condition.

Digital glucometer linking to a cell phone to transmit results



(Source: <http://www.eng.ox.ac.uk/samp/diabetes.html>)

Bottom Line

To be successful, provider organizations will need to become more efficient – as well as align data and empower patients with the information and tools they need to manage their care.

Truth #3: Cost and Quality Transparency



Cost and quality transparency will be demanded by payers and consumers alike.

■ Pay-for-performance is a real, permanent healthcare reform driver.

- P4P is currently voluntary but will become mandatory.
- Medicare will be the tipping point to national adoption.

■ Quality measures will be increasing – and the results will be public.

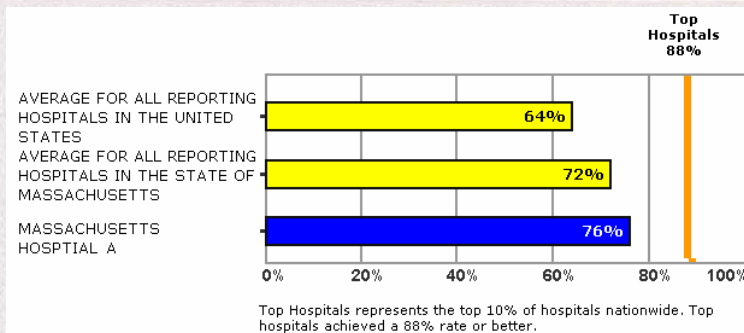
- “Reputation for quality” will not be enough.

■ Some payers and states have begun transparency initiatives, more will follow.

- Price and quality data will be available for each hospital and physician on the Medicare Web site. (HFM, July 2006)
- California posts hospital cost comparisons on its state government website with prices of all services, goods and procedures for California hospitals. (National Conference of State Legislatures, August 2006)

According to CMS Administrator Mark McClellan in 2004, over the next 5 to 10 years pay-for-performance based compensation could account for 20% to 30% of what federal programs pay. (Source: To Get Doctors to Do Better Health Plans Try Cash Bonuses, WSJ, Sept 17, 2004)

Sample CMS Hospital Report Card



Bottom Line

Provider organizations will need to deliver high-quality, low-cost care, capture results – and use them to improve. IT needs to provide more leverage.

Truth #4: Multi-tiered



With a single payer system doubtful anytime in the near future and reimbursement continuing to decline, the healthcare system will settle into three tiers of patients.

■ **Changes in insurance coverage will create three tiers of patients:**

- **Tier 1: “Whatever it costs”** – those that can pay beyond traditional insurance
- **Tier 2: “Discerning concerned”** – those with some insurance, who will pay out of pocket for needed services
- **Tier 3: “Emergencies only”** – those that cannot pay or have little to no coverage

Many Americans support equal access to care			
Statement	Agree	Disagree	N/A
“People who are unemployed and poor should be able to get the same amount of quality of medical services as people who have good jobs and are paying substantial taxes”	56%	18%	26%
“The government should do whatever is necessary, whatever it costs in taxes, to see that everyone gets the medical care they need”	53%	23%	24%

(Source: WSJ, July 19, 2006)

■ **For those in Tier 1, the patient will be at the center.**

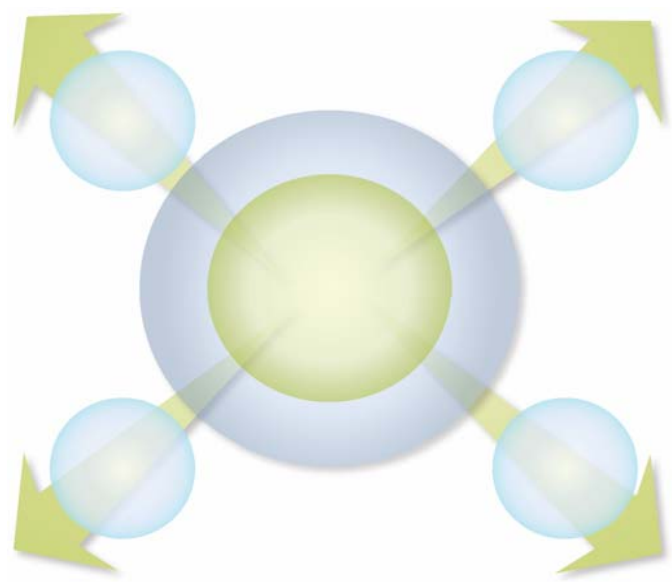
- Service excellence will be one differentiator.
- Community hospitals will need to seek new ways to provide service to patients at competitive costs.

■ **As cost shifting increases, price will be a key differentiator for the “discerning concerned” tier.**



To be successful, provider organizations will need to excel at attracting the first tier of empowered patients who can pay beyond traditional insurance and efficiently treat all comers.

III. Working Towards the Future State



Barriers to Technology Adoption



IT can help provider organizations address many of today's issues, but current results – and value – are questioned.

■ **Cost continues to be the biggest barrier to adoption of IT – particularly for smaller facilities.**

- Fifty-nine percent of hospitals surveyed by the AHA reported that initial costs were a “significant” barrier; 36 percent indicated it was “somewhat of a barrier”
- Ongoing costs was second on the list with 33 percent saying they are a “significant barrier” and 54 percent saying they are “somewhat of a barrier.” (”Forward Momentum: Hospital Use of Information Technology”, AHA, 2005)

■ **Some current IT solutions are not usable; many only address one part of the problem.**

- Usability is a current issue, but will be a future mandate.

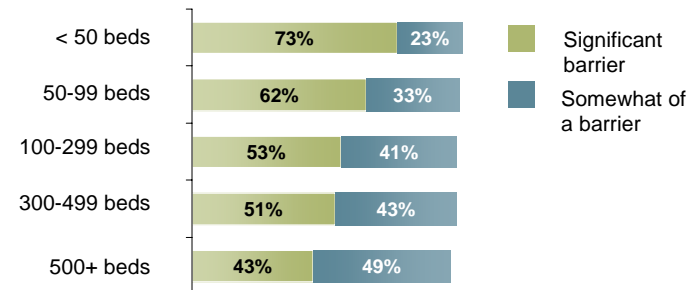
■ **Continued investment in IT – without a clear return – is unsustainable.**

- Provider IT operating budgets cannot continue to rise at a higher rate than overall budgets without a measurable return.

Average Health System Percent of Operating Expenses Budgeted for IT		
2003	2005	% Change
2.9%	4.6%	59%

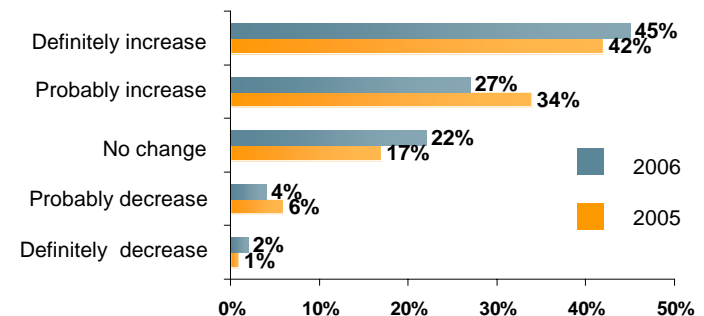
(Source: Gartner, September 12, 2005)

Percent of Hospitals Who Say Initial Costs are a “Significant Barrier” or “Somewhat of a Barrier”



(Source “Forward Momentum: Hospital Use of Information Technology”, AHA, 2005)

Projected Change in IT Operating Budget, 2005 vs. 2006



(Source: HIMSS 2006 CIO Survey, February 2006)

The Role of IT



The IT delivery model needs to change.

Why is it important?

- IT is a *requirement* to respond to many market trends, but the current model is unsustainable.
- There is a lot of competition for capital dollars.

Why haven't we changed already?

- While the importance of IT was recognized, no one knew what it should cost.
- Few measures of service levels.

So what should I be doing – or doing differently?

- Understand service level requirements.
- Know the lowest cost – and competent – provider for current solutions.
- Use the ROI on one project to fund another.
- Be honest about what requires “your” people.
- Look at total cost of ownership.
- Assess deadlines before you start.

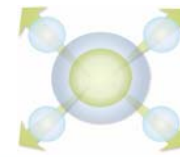
Total cost of ownership is more than just vendor upfront software license fees

EMR Pricing Per MD ¹		
UPFRONT COSTS		
<i>Software & services</i>		
Software licensing	\$10,000 per MD	29%
Implementation & training (includes planning and advising as well)	\$12,000 per MD	34%
<i>Hardware</i>		
Hardware and associated software	\$7,500 per MD	21%
Interfaces ²	\$5,500 per MD	16%
ONE TIME TOTAL	\$35,000 per MD	100%
ONGOING COSTS		
Annual software related support and maintenance	\$2,500 per MD	17%
Additional annual costs (includes connectivity, support, travel, supplies, misc.)	\$12,000 per MD	83%
PER YEAR TOTAL	\$14,500 per MD	100%

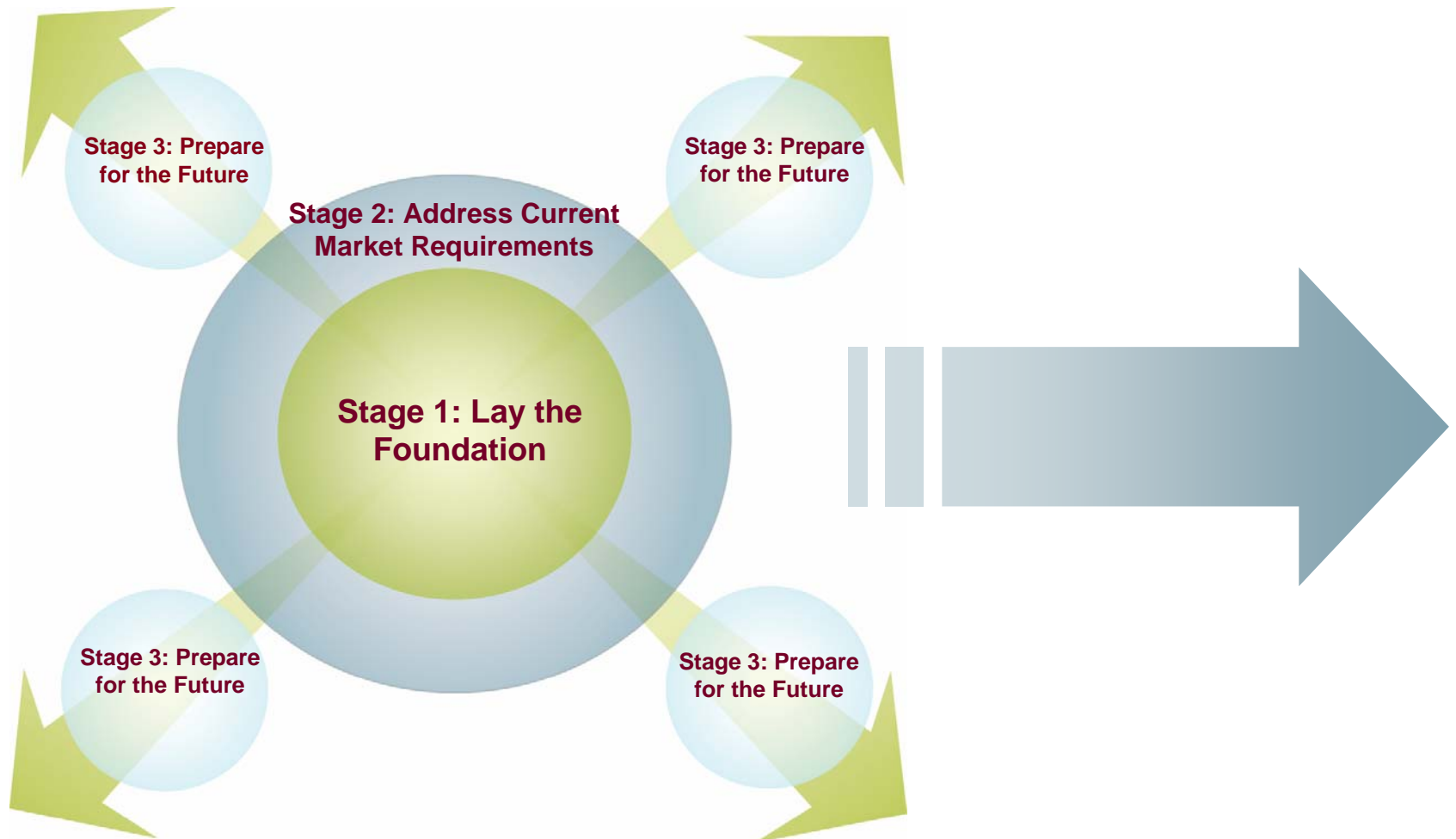
¹Assumes a 5 physician practice and a “high end” EMR solution

²Assumes 2 lab, 4 PMS, 2 hospital, and 1 pharmacy interfaces

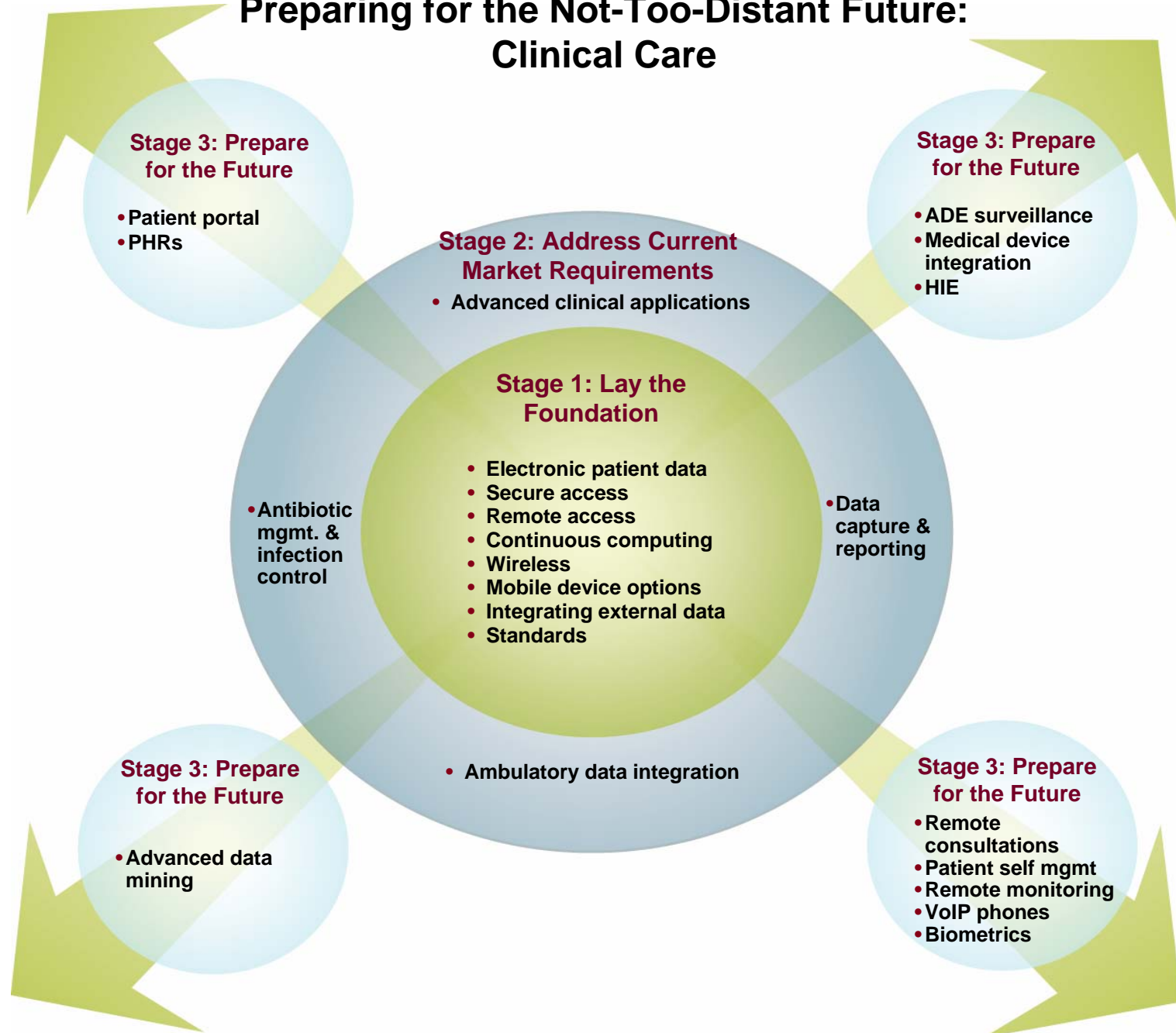
Three Stages



To be successful, healthcare provider organizations must take on the tough projects – and take them on correctly, learning from past successes and failures. There are three stages of projects.



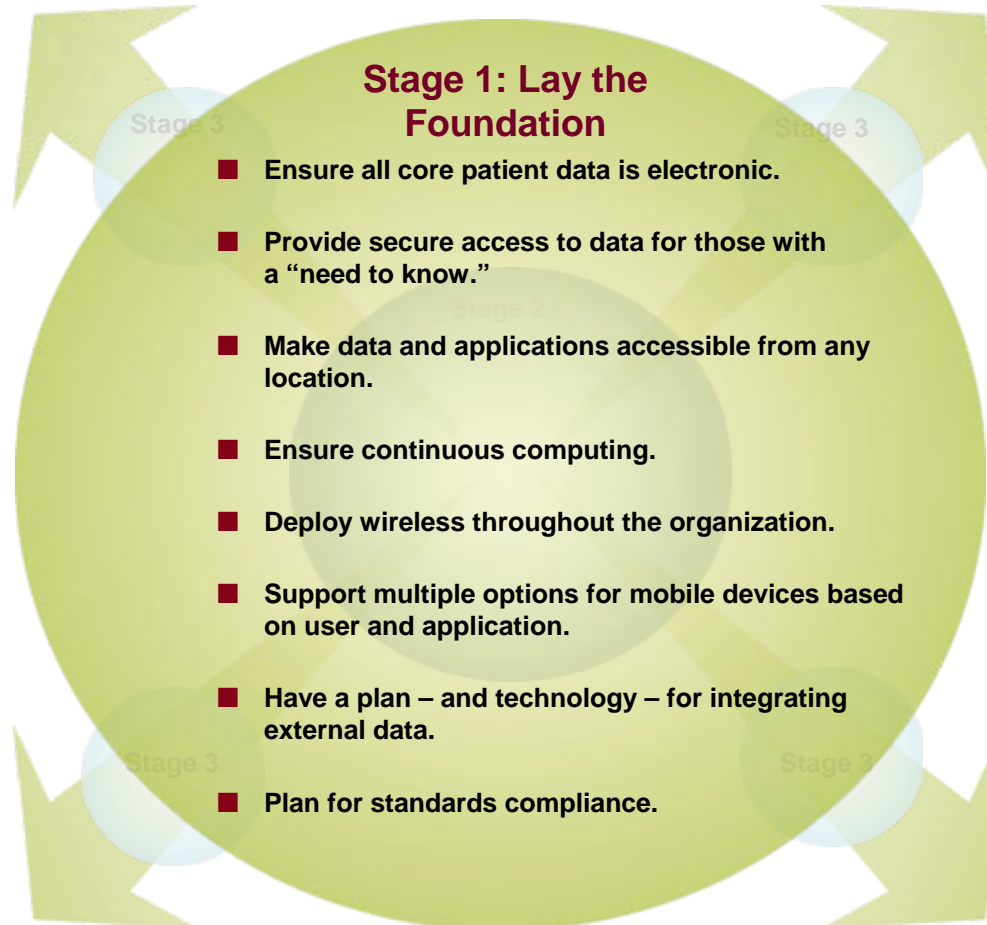
Preparing for the Not-Too-Distant Future: Clinical Care



Stage 1: Lay the Foundation



Before getting started on today's priorities, a baseline level of IT must be achieved and maintained.



Stage 1: Lay the Foundation (cont.)



Building for the future is not just about technology; process and organizational milestones must also be realized.

Process

- **Aggressively seek the lowest cost IT positions**
 - Always know the lowest cost provider
- **Have an IT strategy, funded for multiple years**

Organizational

- **Governance structure**
 - Decision makers with clout; include major clinician groups (including community providers)
- **Meet regulatory compliance**
 - Quality reporting
 - Increasingly complex payer requirements
- **Decision support management**
 - Organization aligned with quality initiatives
 - Process and responsibility for decisions on CDS

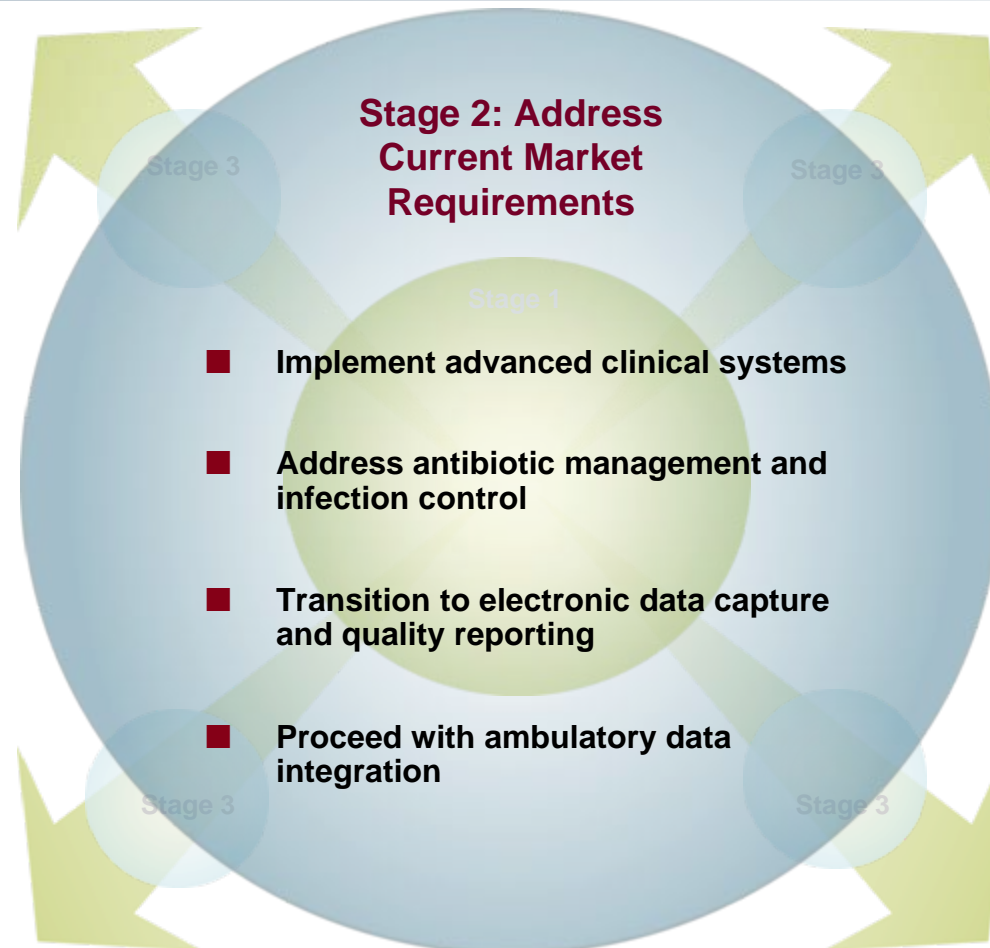
Metrics are more common among <i>Hospital & Health Network's</i> "Most Wired" hospitals			
	All	"Most wired"	"Least wired"
Baseline measurement established for each metric	61%	74%	39%
Definition of financial metrics and targets set	62%	75%	44%
Definition of quality, safety or patient satisfaction metrics and targets set	60%	75%	41%
Formal time reviewing project metrics with stakeholders	62%	76%	39%
Specific plan for when project metrics and original business case objectives will be measured and evaluated	56%	72%	32%
Pre-project risk analysis	61%	75%	38%
Pre-project cost benefit analysis	67%	78%	48%

(Source: HHN Most Wired Survey, 2006)

Stage 2: Address Current Market Requirements



Once the minimum threshold has been reached, there are steps that every hospital will need to take in order to address today's challenges.





The first step to support closed loop medication management is to implement CPOE (with basic decision support), eMAR, and pharmacy.

Why is it important?

- Regulatory and private organizations like Leapfrog are driving patient safety as an IT priority – and CPOE will become the standard of practice in the inpatient and ambulatory settings.
- Pay-for-performance initiatives will provide incentives to hospitals to meet and report defined quality measures.



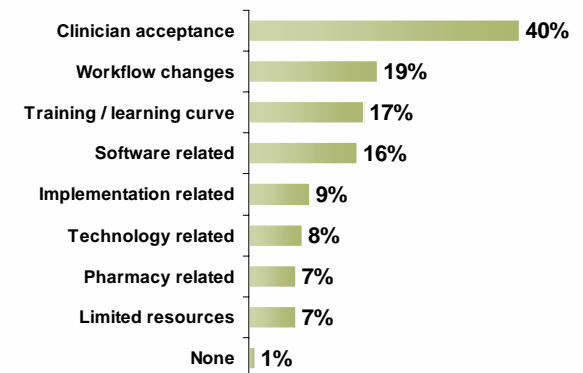
But why isn't it more widespread today?

- The workflow changes required are huge and the learning curve for physicians is significant.
- Many existing solutions are not usable.
- Using disparate vendors can lead to integration issues, whereas relying on a single vendor can limit functionality.
- News of failures have led to the excuse that CPOE may actually increase errors.
- CPOE solutions from some vendors are incomplete; clinical decision support solutions are not optimized.

Data from the 2006 KLAS report finds that while there is more CPOE verified as live, overall adoption is still low.

- 5.7 percent of US hospitals are doing “some CPOE” on KLAS verified commercial products, an increase from 4.0 percent in 2005
- 3.2 percent of US hospitals are “actively using CPOE” (MDs entering >50% of patient orders) on KLAS verified commercial products, up from 2.5 percent in 2005
- CPOE is more predominant in teaching hospitals (64 percent of live sites) versus non-teaching hospitals (36 percent of live sites).
(“CPOE Digest 2006”, KLAS, February 2006)

Surprises Encountered or Obstacles Overcome in CPOE Implementation



(Source: “CPOE Digest 2006”, KLAS, February 2006)



The success or failure of a CPOE and/or eMAR implementation hinges as much on organizational factors as it does on the technology itself.

So what should I be doing – or doing differently?

■ **Focus on workflow implications.**

- Understand *in detail* how processes will change with CPOE for all scenarios.
- Have a defined process for identifying consequences and addressing them as part of the CPOE implementation.

■ **Involve physicians from the start.**

- Less than a third of CIOs indicated that physicians are “very involved” in the clinical IT assessment and purchase process in their organization.
(Health Data Management CIO survey, March 2006)

■ **Secure executive support.**

- Executive support and accountability is a must; the effort must be viewed as a clinical project rather than an IS project (i.e. CMO accountable for success)

■ **Test for usability.**

- A 2006 review of published literature found that drug safety alerts are overridden by clinicians in 49% to 96% of cases. (“Overriding of Drug Safety Alerts in Computerized Physician Order Entry”; J Am Med Inform Assoc. 2006;13:138-147.)

■ **Be prepared to “rule out” your current vendor if they can’t provide an acceptable solution.**

- Focus on an single-source solution for a given *suite* of products, also called a “best-of-cluster” approach.
- A truly integrated suite will have a single set of master files, a single clinical data repository, a single clinical decision support tools / engine, and shared clinical functionality across applications.

Learn from the experience of other organizations

A controversial study in the December 2005 issue of *Pediatrics* found that the death rate for pediatric patients transferred to the Children’s Hospital of Pittsburgh **more than doubled after the implementation of CPOE**. The Children’s Hospital and Regional Medical Center in Seattle Washington implemented **the same CPOE system** one year later and **conducted a site visit** to Pittsburgh to benefit from “lessons learned.” According to a July 2006 article in *Pediatrics*, Seattle found that implementation of CPOE in their pediatric ICU resulted in **non-statistically significant improvement in mortality**. Some **key differences** in implementation:

- Seattle went live with **28 ICU order sets**; Pittsburgh had none.
- Seattle permitted **orders to be entered for patients before they arrived** in the ICU; Pittsburgh only began ordering when the patient arrived.
- At Seattle, emergency **medications could be removed from the medication dispensing system** on the unit **without a pre-existing order or pharmacy approval**. In Pittsburgh all pharmacy stock was moved to a central pharmacy after implementing CPOE.
- Seattle invested in tools to **make ordering quicker** (order sets, pre-filled order sentences, pick lists for indications).

Bottom line: Learning from others before implementing CPOE is a “best practice.”

Source: (Mark A Del Beccaro, et al.; Computerized Provider Order Entry Implementation: No Association with Increased Mortality Rates in an Intensive Care Unit. *Pediatrics*, July 2006)



Address antibiotic management and infection control.

Why is it important?

- Antibiotic management and infection control is the next big push in patient safety.
- Infection measures are already being added to pay-for-performance programs and CMS has indicated it will not pay for patients with certain types of hospital acquired infections in 2008.

But why isn't it more widespread today?

- Many hospitals are still struggling with the costs and effort associated with selecting and implementing core clinical systems.
- May be seen as an “add on”

So what should I be doing – or doing differently?

- Consider advanced antibiotic management and infection control products on the market today.
 - While primarily used by the infectious disease team, solutions can be extended to be used by other clinicians – particularly in the ICU.
 - These products create a specialized data base which is used to:
 - ▶ Provide surveillance of hospital infections,
 - ▶ Make recommendations on the appropriate medication route and dosing, and
 - ▶ Alert when certain conditions are detected that may indicate a need to change antibiotic management.

The CDC estimates that as many as **90,000 people die each year from hospital-acquired infections** – more than **twice the number of people who are killed annually from motor vehicle crashes**. (National Vital Statistics Report, CDC, June 28, 2006; Weinstein RA. Nosocomial infection update. Emerg Infect Dis 1998;4:416–20)

Handheld Version of Antibiotic Assistant from TheraDoc



Electronic Data Capture and Quality Reporting



Transition to electronic data capture and quality reporting.

Why is it important?

- Organizations must understand and capture the specific data needed to report on quality measures – and use that information to improve outcomes.
- The need for automated data capture and reporting solutions spans across settings and departments, including the point of care, the OR, and the ED.

A recent review looking at the time associated with quality reporting in *Health & Hospital Networks* found that **quality nurse staff can spend more than an hour filing reports for three measures alone** – AMI, heart failure, and pneumonia. According to interviews, **reporting on these three conditions required a total of 95 data elements** from the patient's chart.

- Acute myocardial infarction: 20-25 minutes/patient
- Heart failure: 10-15 minutes/patient
- Pneumonia: 20-25 minutes/patient

(Source: Hospitals & Health Networks, January 2007)

But why isn't it more widespread today?

- Most major CIS vendors do not incorporate quality reporting solutions into their product suites.
- Web-based tools that require manual data re-entry are still the current state of the practice; vendor tools that interface with the discharge record or perform point-of-care data capture are not widespread.

So what should I be doing – or doing differently?

- Focus on an incremental strategy that closely mirrors the rollout of the CIS and the increasing availability of data electronically.
 - This requires an IT solution that organizes the work of the quality nurse, accepts data from electronic feeds to populate the data elements for patients targeted for measurement, collects the exact information needed for external reporting, and submits data electronically.
- Consider emerging solutions that interface with ADT, lab, and other systems to automatically collect available data.
 - When data capture begins in real time while the patient is still in the hospital, the quality nurse is able to perform as a care manager as well, alerting members of the care team when patients are overdue for an intervention or documentation is complete.

Ambulatory Data Integration



Proceed with ambulatory data integration.

Why is it important?

- The majority of care is provided in the ambulatory arena; care needs to be safe, with data shared between providers across settings.
- The CCHIT has developed a comprehensive set of certification criteria for functionality, interoperability, and security.
- Exceptions to Stark and anti-kickback laws become effective October 2006, and physicians will expect provider organizations to have a plan for supporting EMRs and e-prescribing moving forward.

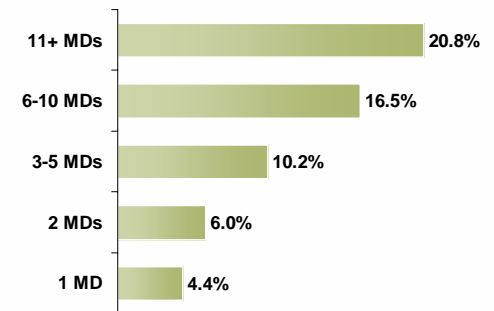
But why isn't it more widespread today?

- Solutions are expensive.
 - Many small and medium sized practices simply do not have the financial capacity or resources to implement and support the EMR.
- Usability remains an issue.
 - EMRs take physicians more time to use – not less – particularly in the first few months following implementation.
- There are currently too many choices to choose from.
 - More than 500 vendors currently market physician office applications in the U.S. (Gartner, November 22, 2005)
- Stark and anti-kickback laws have served as a barrier and an excuse for many hospitals unwilling to move forward.

A recent study in *Health Affairs* found that for solo or small group practices, **EMR purchase costs averaged \$44,000 per provider.** Ongoing costs were estimated at **\$8,500 per provider per year.** (Source: Miller, R. et al. "The Value of Electronic Health Records in Solo or Small Group Practices." *Health Affairs*, September/October 2005; pg. 1127-1136)

Adoption of EMRs is still limited to larger physician practices.

Percent of physicians using EMRs in 2005 by practice size¹



¹Note: EMR is a positive response to four minimum features: computerized orders for prescriptions, computerized orders for tests, test results, and physician notes.

Source: Electronic Medical Record Use by Office-Based Physicians: United States, 2005; National Center for Health Statistics, July 2006



Select EMRs based on usability – not just certification criteria.

So what should I be doing – or doing differently?

■ **Have a plan for extending EMRs out to community physicians.**

- Most core CIS vendors provide an outpatient solution; if an EMR has not yet been implemented in affiliated practices, start by trying to first “rule out” your current vendor.
- Be prepared to offer multiple products however; community physicians may not be familiar or comfortable with EMRs from vendors perceived as traditionally inpatient-focused.

■ **Start with certified systems....**

- As of February 2007, 55 vendors had achieved CCHIT EMR certification.

■ **...but test for usability.**

- Certification applies only to requirements around functionality, interoperability, and security; the product may be certified but that does not always translate into “usable”

■ **Get references.**

- Speaking to providers at the vendor site where you have a connection can offer insight into usability and help identify unanticipated problems (don't go to the showcase site).

■ **Align workflow.**

■ **Be creative with financing.**

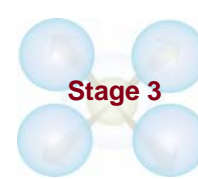
- Sign contracts that allow you to deliver EMRs to physicians at marginal costs.
- Consider an ASP-based product or emerging solutions that integrate software and services, with specific revenue increases as a result of using the system guaranteed by the vendor.

Top Barriers to EHR Adoption (as seen by financial executives)

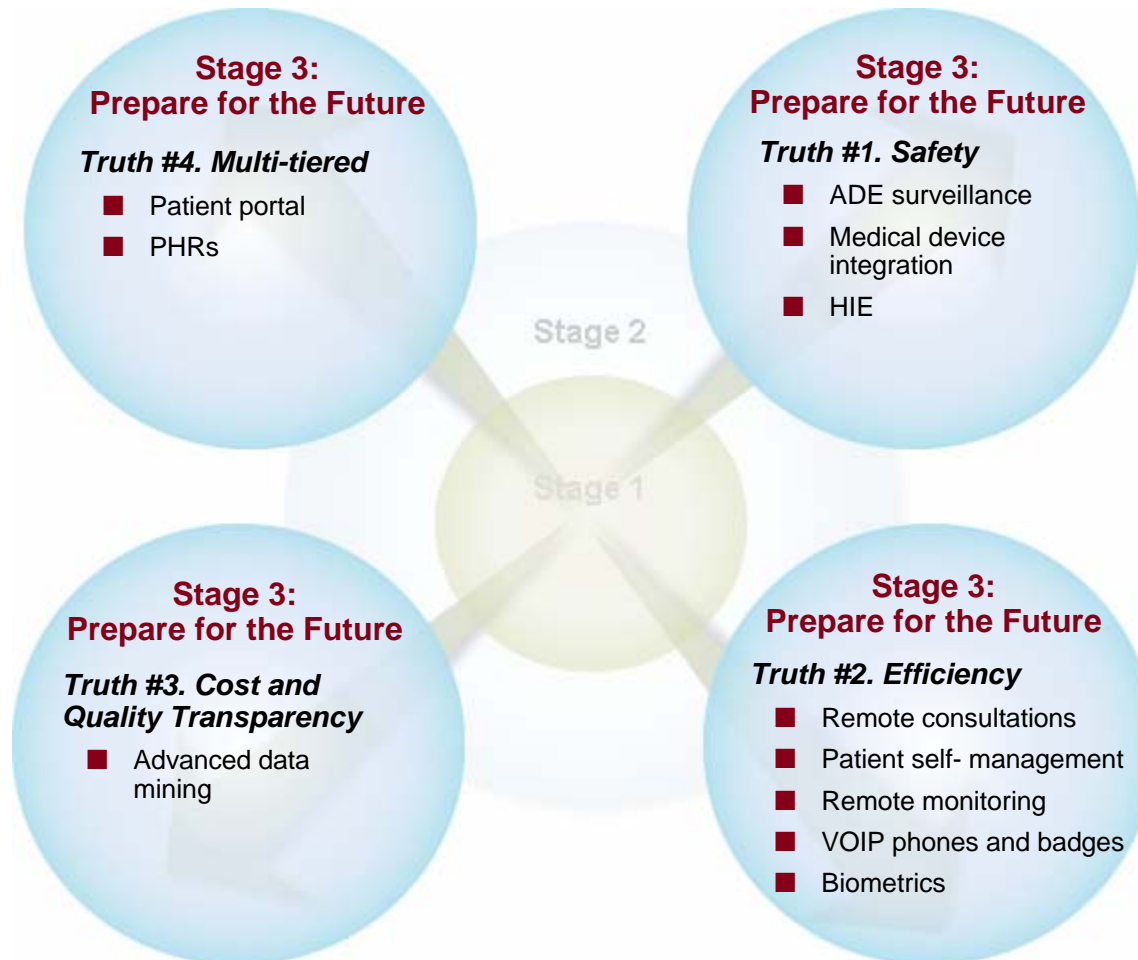
Barrier	Percent
Lack of consistent national information standards and code sets	62%
Lack of available funding	59%
Concern about physician usage	51%
Lack of interoperability with other systems	50%
Lack of available staff resources	43%
Lack of existing regional information network	37%
Concern about payer adoption	32%
Insufficient financial return	28%
Privacy concerns	16%

Source: "Overcoming Barriers to Electronic Health Record Adoption", HFMA, February 2006

Stage 3: Prepare for the Future



Once Stage 2 projects have been completed, provider organizations can begin to focus on efforts that address their unique priorities and opportunities. The Four Truths provide a framework for future-focused initiatives.





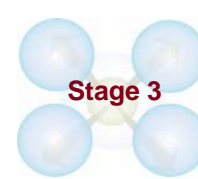
Implement ADE surveillance to better detect and prevent future problems.

Why is it important?

- Self-reporting of errors and adverse events has been shown to capture only a very small percentage of actual problems.
- There is also growing concern that the number of adverse events that are preventable is widely underestimated.

What can I be doing?

- Implement new processes and new IT to aid in understanding ADEs in an effort to better detect and prevent future problems.
- ADE tracking uses rules to scan information about test results, medication administration (of antidotes), and clinical documentation in order to identify potential ADEs.
- This can be used in real time to alert care teams to emerging situations so they can initiate correction action, as well as retrospectively to gain a much more complete picture of gaps in the current safety net for ongoing quality improvement.



Increase integration of medical devices with clinical information systems.

Why is it important?

- Manually transcribing time-sensitive patient data captured electronically by medical devices is time consuming, inefficient, and prone to errors.
- Interfacing smart devices with CIS/eMAR applications improves workflow and reduces errors.
- Currently, there are many device manufacturers and a lack of adoption of communications and data messaging standards; each device has its own proprietary protocol.

What can I be doing?

- Start by understanding your CIS vendor's approach to integrating medical device data.
 - Some CIS vendors have started to enhance their clinical applications to the point where the applications can import and automatically store medical device data.
 - ▶ Epic's clinical documentation system can be configured to load each type of incoming patient data (e.g. pulse, respiration) into the appropriate row on its electronic flow sheet.
 - ▶ Cerner announced a device connectivity strategy called CareAware in February 2006 which will enable CareAware devices to integrate with the company's Millennium architecture.
- There are now third-party vendors with products specifically designed to connect medical devices and clinical IT systems.
 - Vendors such as Capsule Technologie receive data from the medical device via any number of different communication protocols, reformat the data into something the CIS can accept, and then send this reformatted data to the CIS.
- Medical devices provide a high volume of data; ensure you understand your vendor's strategy for filtering information according to clinicians' specific needs.

Smart infusion pumps are an example of how medical devices are becoming "smart":

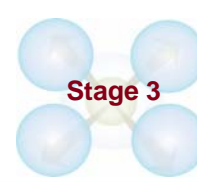
- The CIS sends patient and order data to the smart pump, eliminating the need for data entry by nurses.
- The smart pump sends administration data to the CIS and is immediately available for clinicians and pharmacists to review via the CIS application. (*Medical Device Data

Connectivity to Clinical Information Systems: Ready for Prime Time", FCG, November 2005)

ALARIS Smart Pump



Truth #1 - Safety Health Information Exchange



Prepare to exchange data across – and outside – the organization.

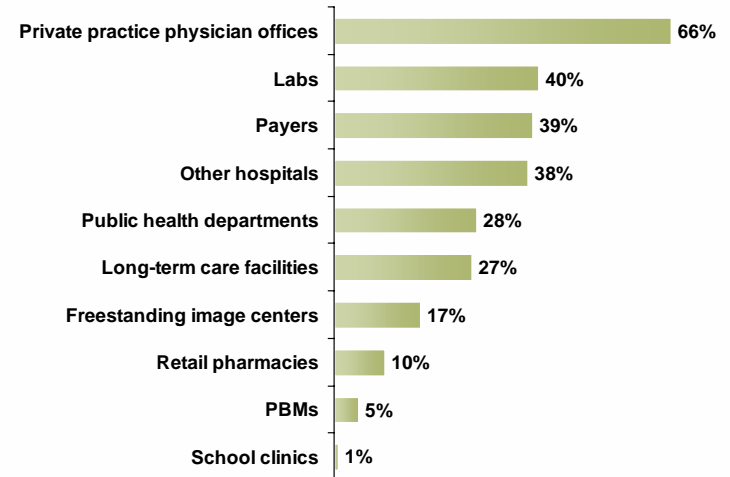
Why is it important?

- The true value of electronic medical records comes when clinical data can be shared by providers across a community.

What can I be doing?

- Share – and receive – information from trading partners; the data exchange should be two way.
- RHIOs are still a work in progress at best – start with HIE.
 - RHIOs may be one – but certainly not the only – model that will be used.
 - Healthcare organizations should invest resources in efforts that create exchange among partners in a community.
- The priority should be connecting with community physicians.
 - Emerging solutions are now going beyond passive look up and can automatically “push” data such as hospital-based tests and ED notes out to a patient’s primary care provider.
 - Actually integrating hospital-generated information into the EMRs community physicians are already using is still quite rare though, largely due to:
 - ▶ The lack of standards
 - ▶ The sheer volume of data generated by the CIS (only a small percentage of which is of interest to community physicians).
- Have a plan for integrating information from clinical trial applications into clinical information systems.
 - This is still a significant gap for many academic medical centers

Overall, 53 percent of hospitals report providing access to electronic patient-specific healthcare information with local or regional partners. However, most “exchanges” are only one way. Current partners include:



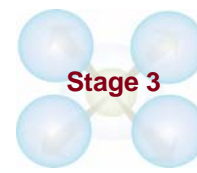
Source: “Forward Momentum: Hospital Use of Information Technology”; AHA, April 2005

Integration of EDC and CIS			
Function	% Installed	% in progress	% Not installed
Electronic Data Capture	40%	4%	56%
Integration with CIS	8%	0%	92%

(FCG/AHC February 2005)

Truth #1 - Safety

Additional projects



There are a number of additional future-focused projects hospitals can consider to support Patient Safety.

Advanced Clinical Decision Support

- Weight-based dosing
- Renal and other diagnosis related dosing alerts
- Embedded context-specific links to clinical knowledge and advice
- Plan for genetics and genomics-based testing and treatment

Point-of-Care applications with CDS

- Smart pumps
- Laboratory specimen collection and POC testing
- Physician documentation
- Blood administration

Universal messaging

- Messages of various types are formatted/converted and delivered to the designated end user device
 - End users can also set up rules depending on time of day or type of message received (i.e. phone calls after 6pm go to my cell)

Additional technologies to support Truth #1 include:

3D Surgery



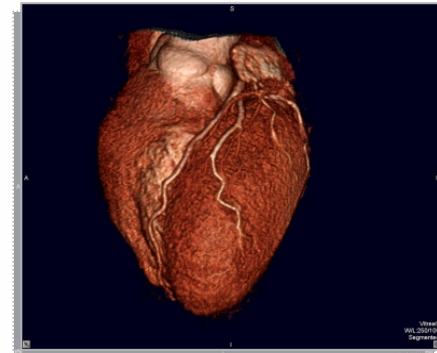
<http://www.kuakini.org/Kuakini/uploadedimages/3D%20Goggles.jpg>

Swallowable cameras



http://medicine.creighton.edu/Surgery/esophagus/Pill_Campill.jpg

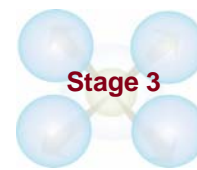
3D Radiology imaging



(Source: Vital Images via AuntMinnie.com, November 3, 2003)

Truth #2 – Efficiency

Remote consultations



Experiment with tools that can transform care from episode-based to continuous and eliminate geography as a barrier.

Why is it important?

- Currently, care is only delivered during face-to-face provider-patient interactions: outpatient office visits, daily rounds in the hospital, etc.
- Once data is electronic, a solid infrastructure and strong security tools can eliminate geography as a consideration to giving care.
- Remote care can be more efficient for patients and providers.

What can I be doing?

- Experiment with email and secure messaging tools as alternatives for responding to clinical questions, requesting prescription refills, and communicating lab results.
 - For more interactive consultations, special scopes and cameras can be used in conjunction with videoconferencing equipment to capture clinical data electronically and send it to a consulting physician in real time.
- Consider remote presence solutions such as VISICU's eICU, which allows hospitals to monitor patients in multiple intensive care units from a single location.
- Robots can also be used to eliminate geography as a barrier.
 - Some organizations are using robots equipped with videoconferencing equipment for a variety of remote consultations, ranging from addressing physician shortages in the ICU and ED to more recently, after-hour translator needs. ("Robot Aids Johns Hopkins Patients", The Examiner, January 9, 2007)

Studies of VISICU's eICU remote monitoring solution demonstrate a number of quality and cost benefits.

- 25-30 percent reduction in severity adjusted hospital mortality for ICU patients
- Decreased incidence of ICU complications of 44 to 50 percent
- Support for the Leapfrog requirements for 24-hour coverage of an intensivist in hospital ICUs
- Reduced costs from decreased hospital length of stay and lower utilization of supplies and services (Crit Care Med. 2000 Dec;28(12):3925-31)

VISICU eICU



(Source: e-ICU at Sentara Norfolk General Hospital)

Truth #2 - Efficiency

Patient self-management



Improve patient self-management by considering technology that can make patients better providers of care.

Why is it important?

- As patient demand increases and the number of primary care physicians does not, patients themselves will actually become the provider in more situations.

“Of all medication-related hospital admissions in the United States, **33 to 69 percent are due to poor medication adherence**, with a resultant cost of approximately \$100 billion a year.” (NEJM 353:5 August 4, 2005)

What can I be doing?

- Start by addressing medication adherence.
 - “Talking” pill bottles such as Rex from MediVoxRx are used in some communities can provide audible label information and medication instructions for patients with vision problems or low literacy levels.
 - Partners Health System in Boston, MA is using an “orb” in patients’ homes that glows green if a patient is adherent and red if a medication is missed.
 - ▶ The solution relies on a “smart” pill bottle that sends a message to an application on the Partners server when the bottle has been opened, which triggers the orb to change from red to green.
 - ▶ The orb changes back to red at pre-designated intervals; for example, in the middle of the night to remind the patient to take their medicine when waking up. (InformationWeek, October 3, 2006)

With an interactive touch-screen monitor and a little training from visiting nurses, over 300 homecare patients in New York suffering from chronic heart failure **now help manage their own conditions**. Each morning, **patients transmit their pulse, weight, blood pressure, and blood oxygen level to a nurse for evaluation**. If any fluctuation is detected, a caregiver takes action. Patients report being **happier, healthier, and more independent** – and payers save \$6,000 for each hospital stay that is avoided. (Source: “Patients Healthier at Home,” *Business First of Buffalo*, June 26 2006)

Rex



http://www.ehiprimarycare.com/tc_domainsBin/News0254/rex-talking.jpg

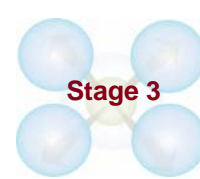
Ambient Orb



http://www.ambientdevices.com/cat/images/aquaorb_wi_thbooks.jpg

Truth #2 - Efficiency

Remote monitoring



Consider remote monitoring for patients inside – and outside – the hospital.

Why is it important?

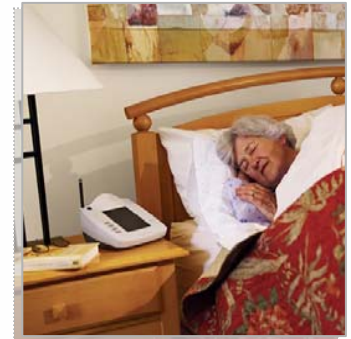
- For patients in the hospital, remote monitoring technology can quickly alert clinicians to a change in a patient's condition, leading to earlier intervention and improved outcomes.
- For patients outside the walls of the hospital, remote monitoring can be an effective tool for reducing the need for routine face-to-face visits and tracking changes in a patient's condition.

What can I be doing?

- Consider solutions in use today that give clinicians access to real time information on a patient's condition.
- The devices, ranging from the wearable to the implantable, capture data on the patient's condition (such as heart rate) at pre-defined intervals and transmit the information back to an application or Web site accessible by the clinician.
 - Alerts can be set up to automatically notify a clinician if the patient's heart rate, weight, etc. goes outside of a predefined range.
- Ensure that organizational processes are in place to collect and filter the information and respond to alerts.

The Latitude Patient Management System, approved by the FDA in February 2006, allows physicians to remotely obtain data from a patient's cardiac device.

- The pacemaker implanted in the patient sends data to a bedside monitor, which transmits the information over the patient's phone line to a Web site accessible by the physician
- The communicator has a range of 8 feet
- Physicians are alerted when potential problems arise, such as a low battery (Seattle Post-Intelligencer, September 12, 2006)



Hoana Medical has developed a sensor that provides continuous physiologic vigilance through the mattress in a patient's bed.

- Without wires or any other connection to the patient, the LG1 invisibly and continuously records:
 - Pulse
 - Respiratory rate
 - Bed exit

(Source: Hoana Medical)

Truth #2 - Efficiency

VOIP Phones and Badges



Pilot electronic tools to improve communication and workflow between providers.

Why is it important?

- Complex care delivery processes require interdisciplinary teamwork and frequent communications between providers.
- Current communication is often ineffective and poorly coordinated.

What can I be doing?

- Pilot wireless / voice over IP (VoIP) phones and badges.
 - These tools enable staff to quickly contact a specific clinician or group of clinicians as soon as an issue arises by allowing the transmission of voice traffic over a hospital's wireless network.

SpectraLink's NetLink
Wireless Telephone



The 9p23 Medic
Portable Telephone



Vocera Badge



- It is important to select the "communication tool of choice" and build policies and procedures around how it is used.
 - Clinicians may be unwilling to carry multiple communication devices (pager, VoIP phone, etc.)

Vocera has developed small, one-button communication badges that are integrated with the hospital's communication system and can be used to immediately contact a specific clinician, a group of clinicians, or a type of specialist.

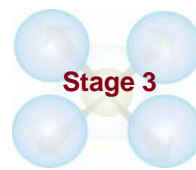
- By pressing the button and saying "Call John Jones" or "Find a cardiologist," a connection is made to the nearest contact who is within the walls of the hospital and available.
- Outside calls can be redirected to the badges.
- Staff can access the system remotely by calling an 800 number and using the same verbal commands used to operate the device.

A January 2004 FCG study at St. Agnes Healthcare in Baltimore, MD, compared call volume and user data from nursing units using Vocera communication badges against those relying on traditional communication methods.

- Overall communication time savings in Vocera units was more than 3,400 hours each year.
- Overhead paging decreased by almost 95 percent on the Vocera unit
- Almost 80 percent of the staff in the Vocera unit expressed a belief that "current communications support efficient nursing workflow," compared with less than 16 percent on the non-Vocera unit. (Vocera/FCG, February 2004)

Truth #2 - Efficiency

Biometric and Proximity Devices



Deploy biometric and proximity devices to improve efficiency and security.

Why is it important?

- Current systems do not adequately support provider workflow; the time to log in and log out of systems can be significant.
- Passwords can be easily lost or forgotten.
- Ideally authentication should combine something a user “knows” (such as a password), something the user “has” (such as a proximity card), and something the user “is” (such as a fingerprint).

What can I be doing?

- Consider implementing a biometric authentication system to streamline clinician workflow and / or enhance security of internal systems.
 - Start with fingerprint scanning, which provides a high level of accuracy without being cost prohibitive or significantly impeding clinician workflow.
 - While widely used in other industries, solutions that rely on iris, retina, face, vein, and hand recognition are still maturing in healthcare.
- Also consider proximity devices, which use radio waves to automatically sign an end-user off and on based on his/her physical location from the workstation.
 - When used in conjunction with a biometric solution, proximity devices can improve security without affecting clinician workflow.



A solution from BioPassword combines biometrics with traditional password entry, verifying a person's identity based on that user's unique keystroke rhythm.

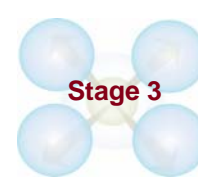
- A person's identity is verified based on that user's unique typing rhythm – specifically the time required for keys to be pressed and released.
- Requires no additional hardware; currently available with Stinger mobile workstations (shown below). (Health Data Management, December 2005)



The International Biometric Group estimates that **annual biometric industry revenues will increase from \$2.2B in 2006 to \$5.7B by 2010** in industries such as retail, hospitality, financial services, and healthcare. (Kroll, The Human Factor, Vertical Systems Reseller, p. 35, July 2006)

Truth #2 - Efficiency

Additional projects



Additional projects to support Efficiency include:

Kiosks

- **Kiosks are emerging as an effective strategy to streamline the patient registration process and capture accurate patient information prior to a visit.**
 - Using a license or credit card, patients can check into the facility, update registration information, sign consent forms, answer clinical questions prior to a visit, pay any co-pays that are due, pay an existing balance, or in some cases even schedule future appointments.

Patient flow and visibility solutions

- **Communication and workflow can often be improved just by increasing visibility to the location of patients and equipment.**
 - Emerging visibility / patient tracking solutions that combine active RFID tags and large display boards can increase transparency of a patient's whereabouts in the hospital, the location of certain medical equipment and outstanding tasks (i.e. rooms to be cleaned, medications to be delivered.)

Delivery robots

- **Robots are increasingly being used to automate processes within pharmacy and lab, but there are other opportunities.**
 - For example, a robot can provide automatic delivery of STAT or new medications, as well as lab samples, linens, and meal trays.
 - Robots provide a more flexible alternative to tube systems, as they can automate delivery of a wider range of items (medications, lab samples, supplies, etc.), and require no structural changes to the hospital itself.

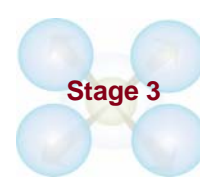
Galvanon eClipboard



Aethon TUG Robot



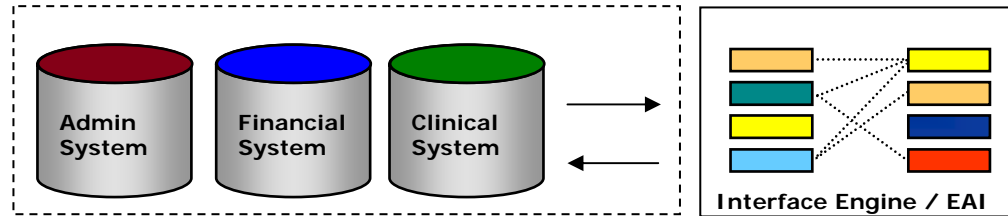
Truth #3 - Cost and Quality Advanced Data Mining



Perform advanced data mining.

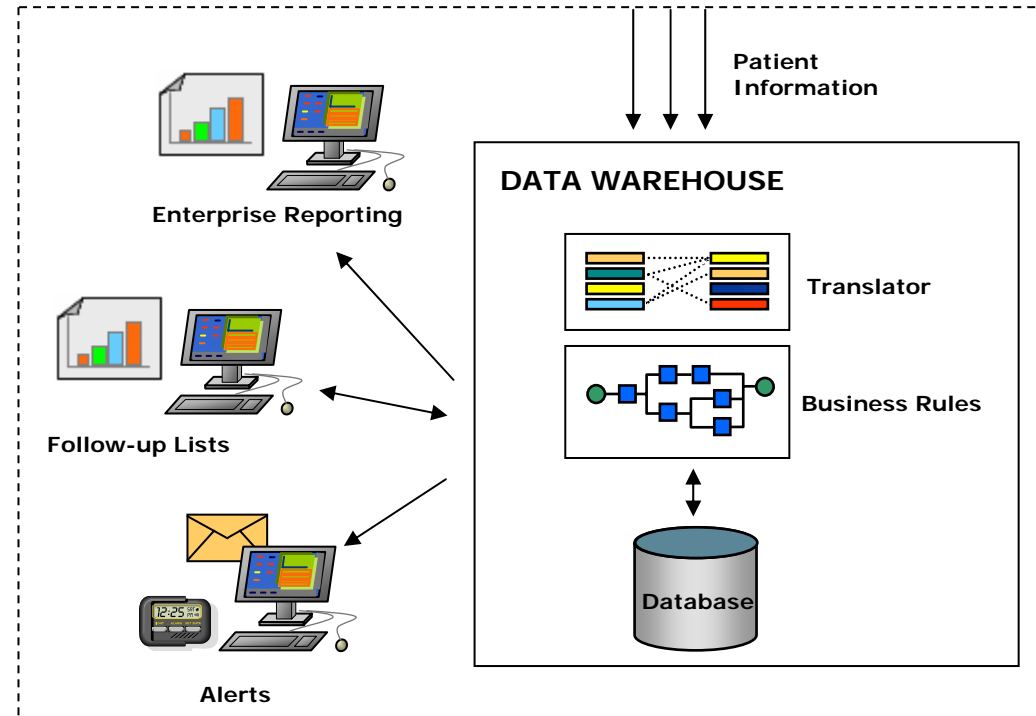
Why is it important?

- Simply capturing core data for quality reporting is not enough.
- To be successful in the future, organizations will need to use this data to improve operational efficiency and outcomes.

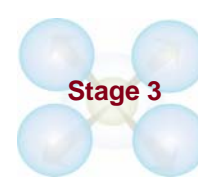


What can I be doing?

- Building a data warehouse that consolidates many different types of information.
 - Scheduling, billing, and registration data from financial systems, clinical data from clinical systems, as well as information from outside sources
- This repository will provide the tools to:
 - Calculate and benchmark financial and clinical productivity measurements
 - Identify operational efficiency problem areas in hospital and practices
 - Conduct data mining and reporting for pay-for-performance.
- Ensure input from clinical, IT, and financial staff for data normalization and design of dashboards and reports
- Phase in based on availability of systems and priority of needs



Truth #4 - Multi-tiered Patient Portals



Build a patient portal that integrates both clinical and financial data.

Why is it important?

- Both patients and providers increasingly expect that data will be readily shared across settings and be available 24 hours a day.
- Patient self-service (e.g. scheduling appointments, updating contact information) is a win-win for the hospital and for Internet-savvy patients.
- Patients who actively participate in their care experience better outcomes than those who do not.

What can I be doing?

- Basic functionality includes the ability to request appointments, access educational materials, and renew prescriptions – but the future demands more.
- Patient connectivity solutions are typically more a function of the vendor providing the ambulatory EMR and financial system than the inpatient clinical system.
 - Start with pre-registration for appointments and billing on the inpatient side.
 - Single sign-on is important to maintain a consistent patient experience, however this can be difficult if the hospital uses different vendors for its inpatient and outpatient settings.
 - Physicians are slowly coming on board with clinical messaging; this capability is typically provided via the PHR or through a third party product (e.g. RelayHealth).
- Have a plan for incorporating data captured from a device in the patient's home in the patient portal to enhance communication and follow up with disease management programs.

Ideally the patient portal of the future should provide “one stop shopping” for:

- Viewing hospital-specific information (physicians, signature programs, directions, etc.)
- Accessing health and wellness information – personalized to a patient's specific condition
- Accessing a current list of medications
- Requesting prescription renewals
- Viewing test results
- Exchanging secure clinical messages with providers
- Updating demographic and insurance information
- Requesting and even booking appointments
- Pre-registering for appointments online
- Viewing upcoming clinical trials (that they may be a fit for)

Truth #4 - Multi-tiered PHRs



Offer PHRs to patients in the community.

Why is it important?

- A personal health record (PHR) is one of the most important – and increasingly publicized – components of the future patient portal.

Patients are increasingly seeking access to their medical records...

- According to a November 2006 study from the Markle Foundation, “9 out of 10 Americans would want to look over their medical records if they could, and two-thirds are interested in accessing records online.” (*National Survey on Electronic PHRs, Markle Foundation, 2006*)

...yet are largely unsatisfied with hospital Web sites.

- 2006 data from Forrester Research finds that less than 40 percent of visitors to hospital sites are “satisfied,” far below the satisfaction reported from visitors at media (86 percent) and financial institution (72 percent) sites. (*Hospital Web Sites Disappoint Visitors, Forrester 2006*)

What can I be doing?

- Offer a PHR to patients; solutions are available from many EMR vendors (start by first ruling out yours) as well as third parties.
- Do not take a “wait-and-see” approach with payer and employer-based PHR initiatives; the best source of PHR data is the EMR, and patients will likely be more comfortable with a PHR sponsored by their provider than a solution from their employer or health plan.

PHR/Patient Portal from Harvard Vanguard

The screenshot shows the 'MyHealth Online' interface for Harvard Vanguard Medical Associates. The page includes a navigation menu on the left with categories like 'My Health Record', 'Linked Health Records', 'Secure Messaging', 'My Appointments', 'Update Profile', and 'Directory'. The main content area features a welcome message for Erica L. Drazen, a 'Back Home Help Log Out' link, and a section titled 'MyHealth at Harvard Vanguard' with a warning: 'MyHealth Online is not intended to replace an office visit. It should only be used for routine and non-urgent matters.' A red circle highlights the left navigation menu.

According to a January 2007 report from Forrester, members have doubts about the privacy and security of payer PHRs.

- Of respondents who did not use a PHR at their health plan’s Web site, 47 percent said did not want a third party to have access to their personal health information and 42 percent indicated they were unwilling to submit personal health information over the Internet altogether. (*Plans’ PHRs Must Overcome Member Anxiety, Forrester Research, January 2007*)

The Bottom Line:

A Different Approach for the Future



Meeting the requirements of the future state of healthcare is more than just implementing technology; ensuring success requires making changes to current processes and implementing technology correctly, with an eye to the future.

-
- **Implementing new technology is not enough; existing processes and approaches for implementation and selection must evolve as well.**
 - **Process**
 - Focus on process integration; technology will not work unless you address workflow.
 - Implementation of advanced clinical systems should be seen as quality projects, with far reaching implications for improving processes and outcomes of care, rather than just IT initiatives.
 - **Usability**
 - Select vendors that are highly usable; as judged by end users.
 - Target decision support to solutions are that important *and* effective.
 - Understand how your vendor will create a path to the future for you.
 - **Technology**
 - Patient safety is a cross-continuum effort – look for clinical applications that support the spectrum of care and have plans for interoperability/regional data sharing.
 - **IT Cost**
 - Shift as much as possible to the lowest cost – and competent – provider that fully meets your needs and will be an effective partner in the years to come.

Next Generation Health Delivery



Imagine a health system in which...

- Achievements of your organization are frequently cited in trade magazines and hospital patient safety leaders serve on national committees.
- You worry less than your peers about an avoidable patient safety incident showing up on the front page of the newspaper.
- Your ability to demonstrate high quality gives you an edge at the negotiating table with health plans.
- The executive team is looking forward to pay-for-performance.
- Community physicians preferentially refer patients to your hospital because they feel they get superior care, and always know their patients' status.
- Patients spend more time receiving care than waiting in waiting rooms.
- Before any patient appears for care, the staff are aware of language needs, mobility needs, and any other need that requires special attention.
- You offer patients multiple ways (e.g., internet, kiosk, telephone nurse advice) to access information and support, aside from just one-on-one encounters and telephone calls to their physician.
- Patient information is collected only once and then shared across settings and departments.
- Your providers can access the information they need at the point of decision-making—i.e. from home or the office, as well as anywhere at the hospital.
- All of the managed care plans seek you out because they know you are the low-cost provider.
- Patients are empowered to participate in their care; and receive safe care at home.