



Healthcare IT Trends and Glimmers

*Dave Garets, FHIMSS
President & CEO, HIMSS Analytics
Executive VP, HIMSS*

7 June 2007

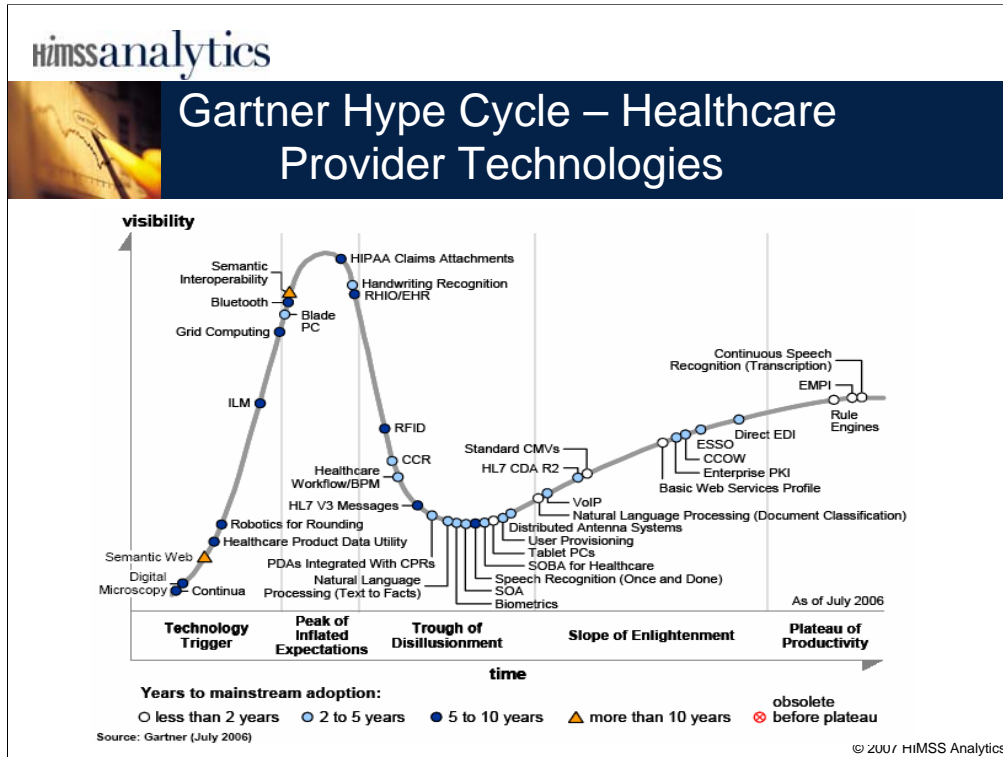


Definitions and Agenda

- **Market trends** – supported by data that shows true market movement toward or away from a certain technology or application.
- **Market glimmers** – supported by anecdotal data, market noise and industry hype

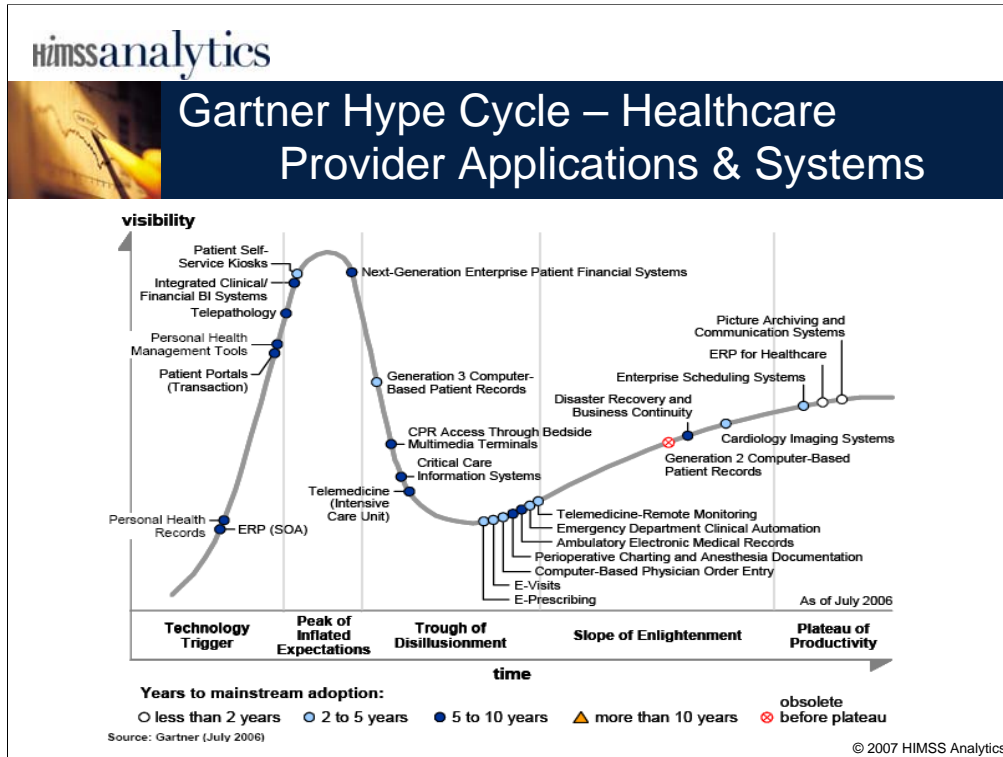
Agenda:

- **Trends** – IT Budgets, PACS, Bar Coding, EMRs
- **Glimmers** – CPOE, RFID, Interoperability Standards, Deriving ROI from Clinical Systems, Digital Hospitals, Benchmarking IT in Healthcare



Gartner has used the Hype Cycle to explain the progress of technologies for years. It takes between 3 – 5 years, on average, for a specific technology to traverse the Hype Cycle, from invention and introduction to the market, to unrealistic expectations of capability and performance, to acute disappointment, and finally to a realistic understanding of capabilities and adoption by mainstream users.

The key to use of the Hype Cycle is to understand your healthcare organization's appetite for change and risk. Technologies that have not reached at least the Slope of Enlightenment and preferably the Plateau of Productivity are not good candidates for implementation at most HCOs. 85% of healthcare provider organizations are Type C, which in Gartner's definition means they are risk averse, slow to make decisions with cultures that are resistant to change. The technologies climbing the Hype Cycle, coming down the other side of the Peak of Inflated Expectations headed for the Trough of Disillusionment not only have risk associated with the technologies themselves, but also with the implementation in companies whose cultures are resistant to change. Stay away until they approach the Plateau of Productivity!



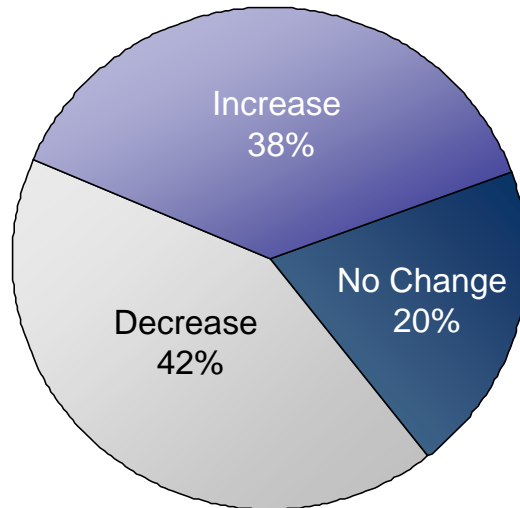
In 2006, Gartner released two Hype Cycles in the healthcare provider space – one on applications and systems and one on technologies. The Applications and Systems Hype Cycle makes it clear that many of the clinical documentation systems, including those in the ambulatory EMR environment, ICUs, emergency departments, and operating theaters, are, at best, making their way to the Slope of Enlightenment, making them risky implementations for Type C organizations to install.

On the Technology Hype Cycle, it's interesting to note that Gartner perceives RHIOs and EHRs to have passed the Peak of Inflated Expectations and to be heading for the Trough of Disillusionment. That means take what you hear about RHIOs and EHRs with a salt lick as opposed to a grain of salt! An essential element of EHRs is the Continuity of Care Record, and Gartner says it's still on its way into the Trough of Disillusionment with a 2-5 year window for reaching the Plateau of Productivity. These initiatives will take time, and CDOs need that time to flesh out their EMRs.

Other technologies that will have significant roles in documentation of care delivery include tablet computers (moving out of the Trough onto the Slope of Enlightenment), natural language processing, standard CMVs, single sign-on, rules engines and HL7 CCOW. All have made good progress towards being ready for implementation by the majority of CDOs.



Trends: IT Budgets are ... a wash



Based on IT Budget as a Percent of Total Operating Expense for the 177 IDSs with trendable data from 2002 to 2007
 Source: HIMSS Analytics™ Databases (derived from the Dorenfest IHDS+ Database™)

© 2007 HIMSS Analytics

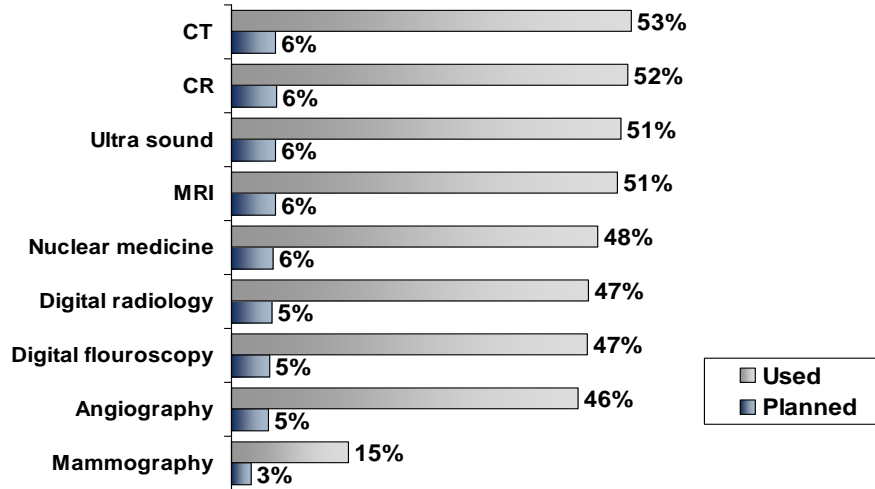
The data seems to suggest this is somewhat of a wash if not a decline. The data is based on 177 integrated healthcare delivery systems that reported percent of budget in the 2002 - 2007 databases. The results are counterintuitive.

Hospital and IDS CFOs have become more conservative with the funding of IT budgets. Our data shows that the midrange of growth is in the 2-2.9 percent range. The number of hospitals and health systems reporting spending in that range is increasing, but many of those health systems' budgets are declining from higher rates of spending. CFOs have few examples of positive return on investment for IT solution acquisitions. How many healthcare organizations have shown tangible return on investment for electronic medical record (EMR) products over the last five years?

The decline in the high range budgets can be attributed to the later stage of the implementation cycle for many institutions that made large IT investments in EMR. After paying for the license fees and initial implementation fees to install and EMR in the first 24 months of the project, the later stages of the EMR implementation require less funding. Therefore, organizations that were on the high end of the IT budget statistics are now moving down to the mid-range budget section.



Trends: PACS — Not just for the Military Anymore



N=5,078
Source: HIMSS Analytics Databases (derived from the Dorenfest IHDS+ Database™)

© 2007 HIMSS Analytics

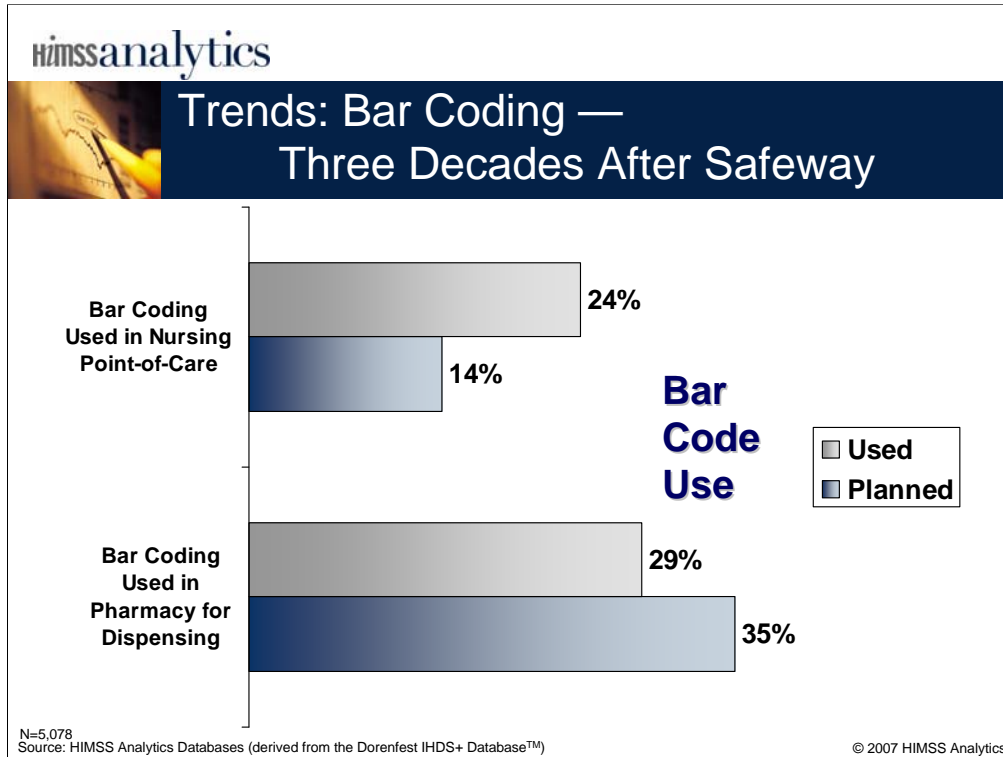
The majority of modalities tracked in this data set are installed by approximately one half of the hospitals in the sample. CT is the most frequently installed modality. Approximately one-twelfth of hospitals indicate that they would like to purchase each of the eight modalities.

PACS continues to demonstrate a rapid rate of adoption by radiology departments. By 2008, 60 to 70% of hospitals will have PACS implemented in the majority of their radiology applications.

Most of the major enterprise healthcare IT vendors have PACS solutions or partners to provide PACS solutions as part of their clinical application portfolios. The top five PACS vendors at this point in time are GE Healthcare, AGFA/Gevaert, Siemens, Fujifilm Medical Systems, and McKesson.

PACS technology has begun to penetrate the cardiology service arena, but we do not anticipate the growth of the cardiology arena to approach the rapid adoption curve for another three to five years.

Integration of PACS and radiology information systems has not achieved the optimal benefits envisioned by healthcare organizations at this time. We expect improved integrated solutions over the next 24 months.



At most, one-quarter of respondents presently use bar coding for either medication administration or dispensing. Future use of bar coding in medication dispensing will accelerate in the next several years, as the vast majority of hospitals that do not presently use bar coding in this capacity are evaluating this type of utilization.

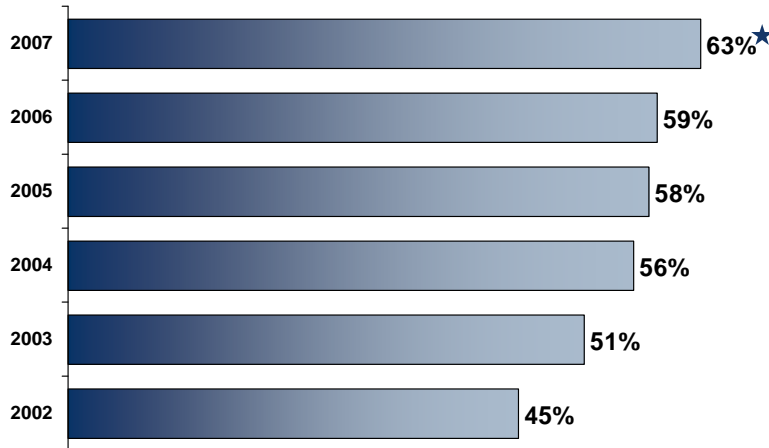
And ironically, it's to make it "safer" for the patient! Bar coding will become another rapidly adopted technology as the FDA drives enforcement of its bar coding standard over the next three years. By 2010, bar coding becomes an embedded and required technology for patient care/patient safety applications.

The reason it has taken healthcare this long to adopt a proven technology such as bar coding, is that once again, the industry stakeholders failed to cooperate in identifying a standard. Once again, the US government enters the scene to drive us toward the use of a technology that will save lives and lower healthcare delivery costs.

Over the next 10-15 years, radio frequency technologies will displace bar coding technologies as these technologies will not only identify the patient or the medications, or the care givers; but they will also be able to track them! We'll discuss RFID in the Glimmers section of this talk.



Trends: EMR Adoption



Based on data from 3,789 trendable hospitals from January 2002 to April 2007
 Source: HIMSS Analytics™ Databases (derived from the Dorenfest IHDS+ Database™)

★ Based on one year worth of data, ending April 2007

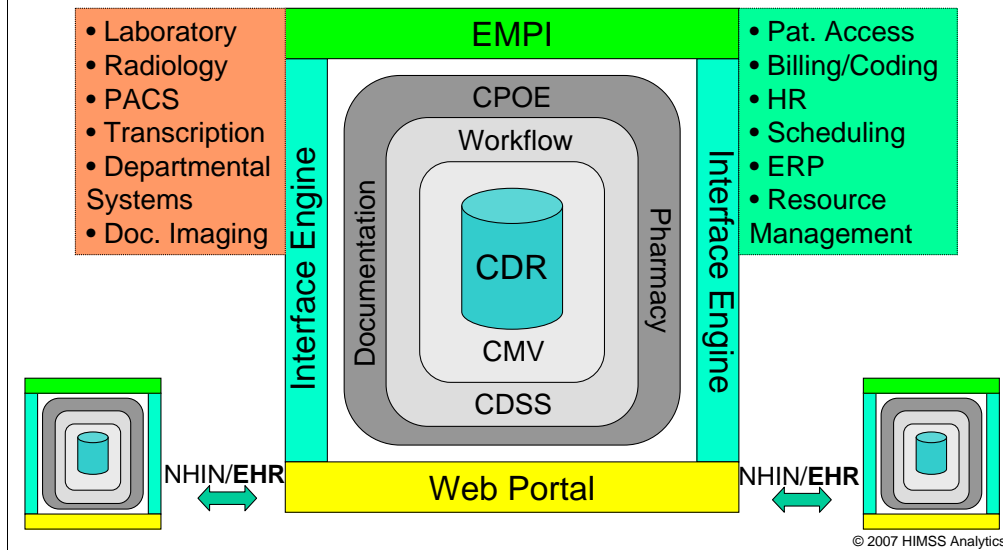
© 2007 HIMSS Analytics

The majority of healthcare IT spending in acute care delivery systems is in the clinical arena after decades of spending on patient billing, accounting, materials management, and ADT systems.

The diagram on page 9 depicts the electronic medical record system components. Many care delivery organizations have clinical data repositories, orders systems, and results reporting, but very few have comprehensive clinical decision support systems supported by controlled medical vocabularies. Few also have electronic documentation for clinicians and even fewer have practitioner order entry (CPOE).

Having said all that, about 63 percent of the hospitals we survey claim to have at least the beginnings of an EMR, and many more are making plans for EMR applications. It's a trend that can only accelerate with all the attention being paid to electronic health records, interoperability standards, and pay for performance reimbursement.

EMR and EHR Environments



The EMR environment is a complex and sophisticated environment. Its foundation is the clinical data repository (CDR), a real-time transaction processing database of patient clinical information for practitioners.

The controlled medical vocabulary (CMV) is critical because it ensures that the practitioners who use the EMR are accessing accurate and comparable data. The CMV normalizes data from a relational and definitional hierarchy that enables other components of the EMR to optimally operate. Without a functional CMV, the clinical decision support system (CDSS) and workflow components of the EMR will not perform as expected by the clinicians in the environment.

The applications of the EMR environment are clinical documentation for all clinicians/practitioners, computerized provider order entry (CPOE) for all clinicians/practitioners, and pharmacy management. We believe that the pharmacy management application has transitioned from a departmental system to an application of the EMR due to the influence of patient safety/medical error reduction concerns.

A foundation of EMR applications, required to improve patient safety and reduce or eliminate medical errors, is composed of the CDR, CPOE, pharmacy management system, and the electronic medication administration record (eMAR), functionality normally found in the electronic clinical documentation systems of most vendors. These are surrounded by an enterprise master person index (EMPI), portals, and interface engine connectivity to supporting systems.



EMR Adoption Model Q1 2007

		% of US Hospitals
Stage 7	Medical record fully electronic; CDO able to contribute to ICEHR as byproduct of SEHR	0.0%
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full PACS	0.3%
Stage 5	Closed loop medication administration	1.3%
Stage 4	CPOE, CDSS (clinical protocols)	2.1%
Stage 3	Clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	21.3%
Stage 2	CDR, CMV, CDSS inference engine, may have Document Imaging	39.3%
Stage 1	Ancillaries – Lab, Rad, Pharmacy	16.3%
Stage 0	All Three Ancillaries Not Installed	19.5%

Source: HIMSS Analytics Databases (derived from the Dorenfest IHDS+ Database™)

N = 4298

© 2007 HIMSS Analytics

Understanding the level of electronic medical record (EMR) capabilities in hospitals is a challenge in the US healthcare IT market today. HIMSS Analytics™ has created an EMR Adoption Model that identifies the levels of EMR capabilities ranging from limited ancillary department systems through a paperless EMR environment. HIMSS Analytics has developed a methodology and algorithms to automatically score more than 4,000 hospitals in our database relative to their IT-enabled clinical transformation status, to provide peer comparisons for hospital organizations as they strategize their path to a complete EMR and participation in an electronic health record (EHR). The stages of the model are as follows:

Stage 1: Major ancillary clinical systems are installed (i.e., pharmacy, laboratory, radiology).

Stage 2: Major ancillary clinical systems feed data to a CDR that provides physician access for retrieving and reviewing results. The CDR contains a controlled medical vocabulary, and the clinical decision support/rules engine. Information from document imaging systems may be linked to the CDR at this stage.

Stage 3: Clinical documentation (e.g. vital signs, flow sheets) is required; nursing notes, care plan charting, and/or the electronic medication administration record (eMAR) system are scored with extra points, and are implemented and integrated with the CDR for at least one service in the hospital. The first level of clinical decision support is implemented to conduct error checking with order entry (i.e., drug/drug, drug/food, drug/lab conflict checking normally found in the pharmacy). Some level of medical image access from picture archive and communication systems (PACS) is available for access by physicians outside the Radiology department via the organization's intranet.

Stage 4: Computerized Practitioner/Physician Order Entry (CPOE) for use by any clinician is added to the nursing and CDR environment along with the second level of clinical decision support capabilities related to evidence based medicine protocols. If one patient service area has implemented CPOE and completed the previous stages, then this stage has been achieved.

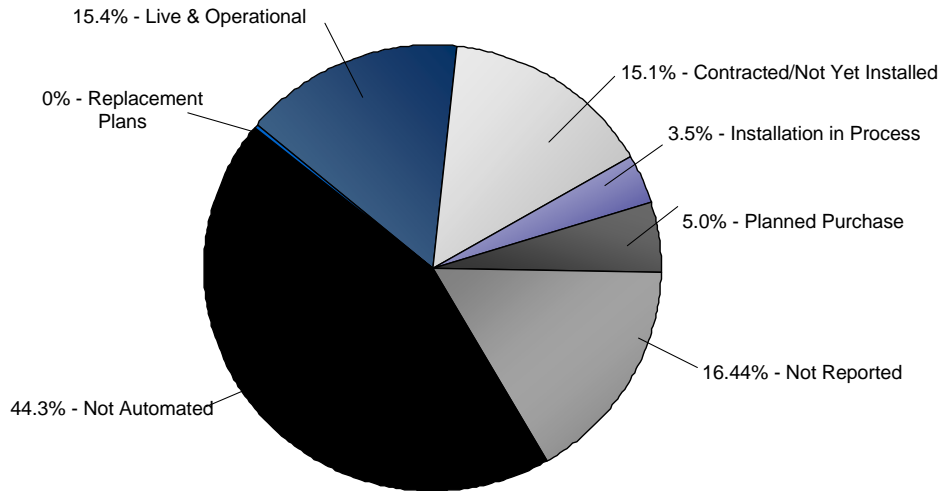
Stage 5: The *closed loop medication administration environment* is fully implemented. The eMAR and bar coding or other auto identification technology, such as radio frequency identification (RFID), are implemented **and** integrated with CPOE and pharmacy to maximize point of care patient safety processes for medication administration.

Stage 6: Full physician documentation/charting (structured templates) is implemented for at least one patient care service area. Level three of clinical decision support provides guidance for all clinician activities related to protocols and outcomes in the form of variance and compliance alerts. A full complement of PACS systems provides medical images to physicians via an intranet and displaces all film-based images.

Stage 7: The hospital has a paperless EMR environment. Clinical information can be readily shared via electronic transactions or exchange of electronic records with all entities within a regional health network (i.e., other hospitals, ambulatory clinics, sub-acute environments, employers, payers and patients). This stage allows the HCO to support the true electronic health record as envisioned in the ideal model.



Glimmers: CPOE Adoption



N=5,078
Source: HIMSS Analytics Databases (derived from the Dorenfest IHDS+ Database™)

© 2007 HIMSS Analytics

Market hype has not driven wide adoption of CPOE at this time. Many care delivery organizations require infrastructure investments before they can successfully install a CPOE.

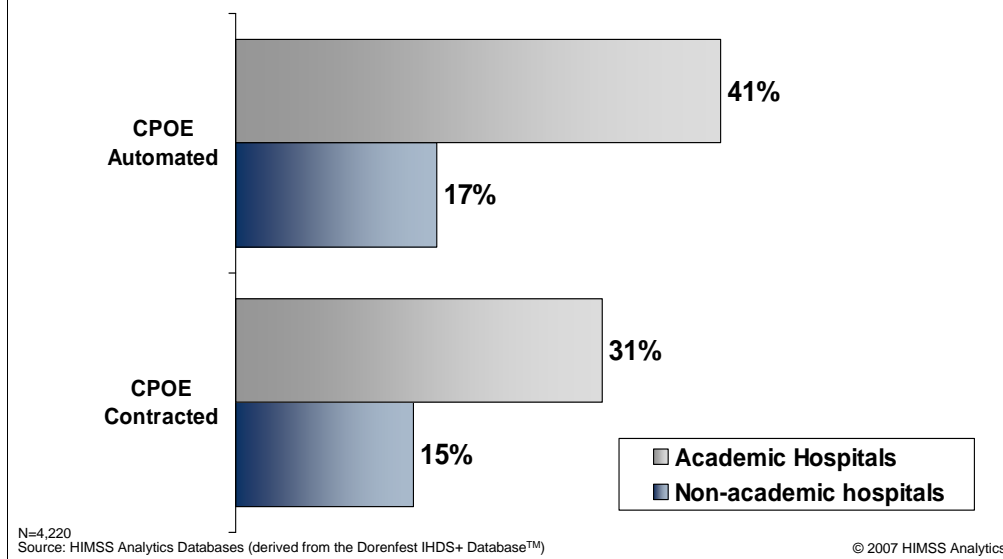
Funding challenges and infrastructure requirements that necessitate tight integration with pharmacy and nursing medication applications will reduce the speed at which hospitals can implement an effective CPOE solution. By the end of 2005, less than 20% of hospitals had implemented a comprehensive CPOE application that delivers the goals and objectives used to justify the funding/purchase. CPOE will become a market trend after 2007 and a mainstream hospital application in 2010.

Adoption of CPOE by physicians will be driven by ease of use via an intuitive application design that minimizes the disruption of the physician's workflow. The hiring of hospitalist and intensivist physician specialists by IDS and hospital organizations will also drive the adoption of CPOE over the next five years.

All of the enterprise healthcare IT vendors have first generation CPOE application products. Because CPOE requires a stable EMR foundation to be successfully implemented, the current enterprise vendors with the largest market share of EMR foundation applications will become the leading CPOE vendors after 2010.



Glimmers: CPOE Adoption



Approximately 41% of academic/teaching hospitals use CPOE, compared to 17 percent of “non-academic” hospitals. However, non-academic hospitals appear to be gaining ground in CPOE adoption.

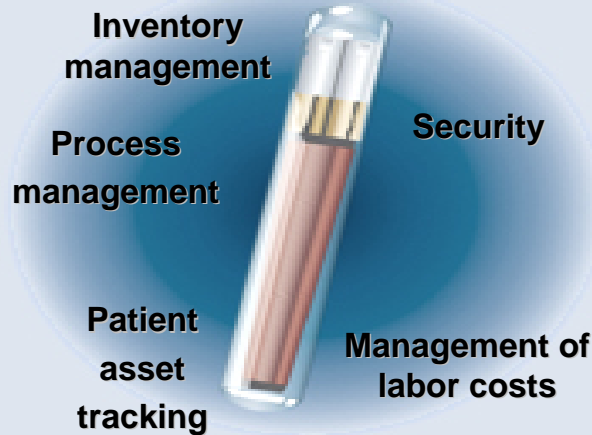
CPOE adoption has traditionally been higher at medical teaching facilities where residents are required to use these applications. But, the hiring of intensivists and hospitalists by hospitals and IDS organizations will begin to drive the adoption of CPOE in non-academic healthcare settings.

Newly graduated physicians and specialists are also more willing to adopt CPOE as they have been exposed to more IT applications in their training.



Glimmers: RFID — Just when you thought it was safe to bar code

Bar Code vs. RFID



© 2007 HIMSS Analytics

“...bar codes and RFID each have advantages. Bar codes must be scanned one at a time in the scanner's line of sight. RFID allows multiple scanning at the same time and isn't restricted to a user's line of sight. RFID is a quickly evolving technology, but more expensive than bar coding, which uses older technology.” Ned Simpson, Principal, CSC Global Health Solutions; Chair of HIMSS Auto ID & Bar Coding Task Force

Radio Frequency Identification (RFID) technology will penetrate less than 5 percent of the US hospital market in the next 5 years. However, by 2010, RFID will have established a viable positioning in the healthcare market as an effective technology solution for patient, device and supply identification and tracking applications.

The adoption of RFID technology by the retail industry and the military will drive down the cost of this technology so that it will become feasible to use in healthcare environments within the next five years.

RFID technology is currently feasible for use in tracking fixed assets within hospital environments today, but proven applications are still a few years away from mainstream adoption by the industry.



Glimmers: Interoperability Standards

One of the world's first, and best, interoperability standards



Source: Joe Nichols, MD

© 2007 HIMSS Analytics

Music notation is one of the best examples of an international standard that works. Hundreds of years ago, someone invented the treble and bass clefs, key notations, time notations, and a variety of notes that symbolize a melody. It was accepted as a standard.

Today, a group of musicians from various countries who've never met one another and don't share the same speaking language can convene, pass out some sheet music, and together play a composition created by a German or Russian or English composer hundreds of years ago, or yesterday, exactly how the piece was intended by its author.

They can play jazz or folk music or blues or classical or country or opera. The standard doesn't specify or dictate the music. It simply provides a communications protocol for being able to share information (the music) with others.

This is what we need to create in healthcare - not cookbook medicine, but rather a mechanism, via standards, of communicating terminology (i.e., SNOMED, LOINC) and normalizing the discrete data captured by advanced clinical computing applications.



Glimmers: Interoperability Standards

Interoperability - *the ability of two or more systems or components to **exchange** information and to **use** the information that has been exchanged.**

- Requires standards for exchange and content that don't exist.
- Problems:
 - Key standards organizations have been battling over how to create the standards.
 - The federal government is loath to “mandate” standards for exchange and content because they would never pass Congress.
 - We don't have CMV standards.
 - We don't have an atomic-level data dictionary.

*Source: IEEE 90

© 2005 HIMSS Analytics

At this time, there is not even consensus on the definition of “interoperability,” much less the dramatically more complex agreements required for exchange and content standards.

Standards bodies ASTM and HL7 are at odds over creation of care summaries that will populate electronic health records and have not agreed on the components or the structure. Their differences appear to center around “incremental interoperability,” which describes how fast provider participants must move to submit coded data to the patient summary.

Asking American care delivery organizations, including acute care and ambulatory providers, to voluntarily adhere to standards for exchange and content is a non-starter, in our opinion. There have to be teeth in the establishment of standards in this arena, but it's a long shot to expect that the federal government, either through legislation or regulation, will step up to an unpopular, probably unfunded, mandate.

Further, vendors of applications in this space have historically relied on selling proprietary solutions to CDOs and don't have much incentive to level the playing field by making their applications, and the data that they contain, interoperable with other vendors' applications.

And finally, there is not an established highly granular “data dictionary” of medical terms on which controlled medical vocabularies can rely, further complicating the ability of applications to interoperate with one another.



Glimmers: Digital Hospitals

- **Oklahoma Heart Hospital**
 - Opened in August 2002
 - Features Cerner medical records, point-of-care and remote access to medical information, and GE cardiovascular diagnostic imaging
- **Indiana Heart Hospital**
 - Opened in December 2002
 - Features GE technology, including its electronic medical records system, CPOE, PACS and digital cardiovascular imaging and ultrasound systems
- **St. Francis Heart Hospital**
 - Opened in September 2004
 - GE technology

Source: HIMSS Analytics™

© 2007 HIMSS Analytics

What is required to create the digital hospital is a high-availability IT infrastructure and a series of foundation EMR applications that provide the ability to document on an exception basis the necessary components of treatment guidelines. Heart hospitals are pulling this off because they are not general purpose institutions, and therefore have a much reduced menu of services and treatment guidelines to address.

Cardiology services is one of the easier modalities to automate because of the amount of standardization that exists for procedures. Standardized protocols and care plans make the transition to automation and paperless environments easier to facilitate.



Glimmers: Getting ROI out of clinical systems

- **Evanston Northwestern Healthcare** implemented an EMR (Epic) with CPOE capability at three hospitals and 50 outpatient clinics and medical offices. The number of system users is 6,200.
 - Number of delays in administering medication has fallen by 70%
 - Omitted administration of drugs has dropped 20%
 - Test results for mammograms now take one day, down from as long as three weeks
 - Cardiographics reports also take one day, down from as many as 10 days
 - Spent \$7.5 million on training and \$35 million capital on hardware, software, and implementation
 - Won the Davies Award for 2004

Source: HIMSS

© 2007 HIMSS Analytics

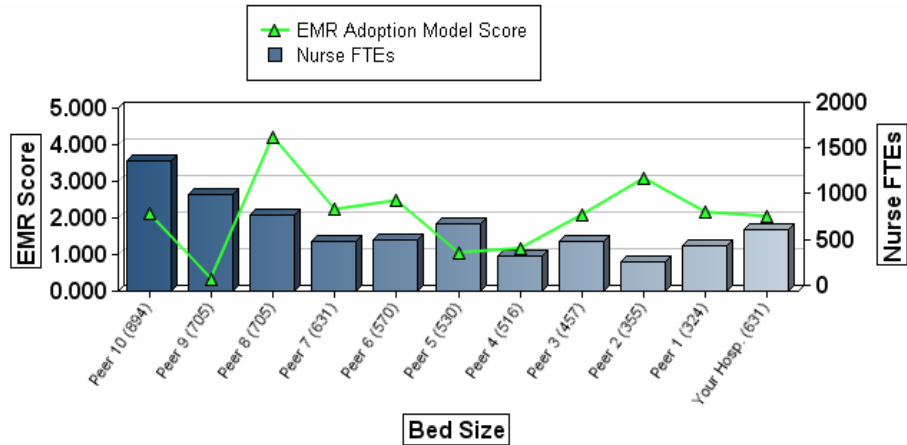
Demonstrating return on investment (ROI) for clinical applications has been difficult because defining the metrics that manifest tangible outcomes is very difficult. The lack of standard metrics for measuring clinical effectiveness will continue to be a huge barrier to being able to effectively measure ROI.

Effective metrics must be able to measure and relate data from financial (reduced cost for clinical service or reduced LOS), clinical (achieving outcome goals with fewer nursing or medication interventions), and quality parameters (patient satisfaction or reduced re-admission for failed treatment processes) for all patient care services. Most ROI metrics today are based solely on financial/cost parameters.

One of the main challenges here, besides a lack of standard metrics, is the lack of replicable examples. It's one thing to cite the experience of an Intermountain Health Care implementation of self-developed applications at LDS Hospital, or the phenomenal work done at Partners Healthcare in Boston, but those environments were not, and still aren't, replicable in 99% of healthcare organizations. What an academic medical center is capable of doing with advanced clinical IT (and residents and other employed physicians) is not replicable in a community hospital where most of the physicians who have admitting privileges are independent business people. There are not yet enough good examples of replicable clinical IT implementations to effectively quantify the answer to "what's the business value of IT investment in healthcare?"



Glimmers: Being able to “benchmark” IT in healthcare



Source: HIMSS Analytics Databases (derived from the Dorenfest IHDS+ Database™)

© 2007 HIMSS Analytics

Hospital and IDS organizations have not been able to gather effective benchmark information until now. HIMSS Analytics provides a comparative IT service composite of reports that will enable hospitals and IDSs to more effectively evaluate their IT operations in supporting their business and clinical functions. That service is provided at no charge to healthcare organizations that participate in the annual survey conducted by HIMSS Analytics.

Over time, HIMSS Analytics will be able to extract best practices from this data that will provide additional support for healthcare organizations to successfully transition their IT operations into efficient and cost effective support environments.



Implications for Hospitals

- Hospitals must position their cultures and budgets to actively pursue IT applications that transform their operations.
- But don't get ahead of yourself or your organization – ***Type C organizations should not be implementing Type A applications.*** Build your application infrastructure and delivery credibility first and wait for the technologies to get to the point where you can implement them safely.
- While “return on investment” remains a critical factor for deciding some IT investments, it cannot become the sole factor in determining the value of IT on service quality or outcomes.

HIMSSanalytics



Thank You!

Dave Garets
HIMSS Analytics
230 E. Ohio St., Suite 600
Chicago, IL 60611
dave.garets@himssanalytics.org