Case Study 1

Transform Healthcare with a Patient Centered Electronic Health Record

An integrated delivery system consisting of three community hospitals with over 800 beds, a faculty practice group, and more than 1600 admitting physicians put a total electronic medical record system into their acute and ambulatory care settings. The record is used by 100% of the physicians, nurses, and other providers. All of the patient related documents are now paperless throughout the organization.

A primary focus of the organization was to continuously improve the health of the community it serves; and to use resources cost-effectively. In order to make their organization the best place to receive care their view was that any patient using their services should be able to move from physician office, to the hospital, to the operating room, to an ambulatory care service with the provider having access to complete, accurate, and up-to-date patient information.

The vision developed by the CEO working with the Board established the organization's number one priority to be the implementation of a paperless electronic health record (EHR) including true computerized physician order entry (CPOE). The leadership agreed that only with every physician and clinician using the system would the EHR project meet their following goals:
- Improve patient safety
- Ensure provider access to the right patient data at the right time
- Ensure accuracy of the information
- Simplify processes and make them consistent.

Key Success Factors

- Leaderships commitment and execution in creating and sharing the vision of a fully integrated system across the entire enterprise. The EHR project steering committee consisted of the top leadership of the hospitals and medical groups. The CEO and COO were active project participants who gave *immediate* attention to any concerns including resistance among the physicians.
- The Steering committee build the financial case based on projected savings in:
    - Billing – lower receivables and staffing efficiencies
    - Diagnosis – greater coding accuracy
    - Less medication errors
    - Centralized scheduling
- A senior executive led the effort as a clinical not IT project.
- A physician leader became the project champion providing guidance and managing physician resistance during the implementation and continues to address issues.
- A large team effort was organized (7 teams) led by clinicians who had process redesign and performance improvement experience and also the trust of the operational staff.
- They took the time to redesign the workflow. They waited one full year for the process redesign before building the system and designed the system based on the new workflows. This effort resulted in 500 integrated high level workflow. Simultaneously, physician began standardizing physician documentation and order sets.
- They made a massive investment in training.
- They had a simple set of rules to govern the implementation such as one time data entry, maintain patient confidentiality, and common look and feel.
- The participants exhibited passion and enthusiasm. They celebrated their success.

Scope
- Implemented 3 hospitals including Emergency departments and over 50 group practices

- Rolled out the systems in 2 years moving to a paperless organization (after a 1 year process redesign)
- Used in all areas of the hospital including ICU, OR, Imaging and testing centers.
- 100% CPOE and clinical documentation done by providers including attending physicians.
- Paperless environment: All results are electronic or scanned into the system. There is limited use of dictation except for sub-specialty reports, OR reports, and some discharge summaries.
- Use specialized documentation templates for any discipline. Foster interdisciplinary notes
- Care plan templates provide a framework for multidisciplinary care
- Nursing uses automated cardex, structured flow sheets, and MAR
- Physicians now maintain accurate, up-to-date allergies, medication list, and problem list encouraged because of the sharing among providers.
- System is accessible in physicians' offices and homes. They are beginning to make record accessible to patients.
- Includes physician, anesthesia and dental billing

Costs

$35 million over 5 years and return projected of $40 million over 5 years for a net return of $5 million.

Lessons Learned.

- More people needed for the implementation than recommended by the vendor.
- Need to emphasize communication among providers who were now using the system instead of talking to each other.
- Physicians will use the system if they can see the value. CEO accepted the loss of 8 older physicians. (1/3 of the attending physicians are splitters)
- Began with the basics and added functions over time, not trying to make it perfect before implementation. Limited clinical decision support.

Value

Patient Safety
- Transcription errors reduce to 0
- Delayed administration of medication decreased by 70%
- Omitted medications decreased by 22%

Provider Access
- Shortened diagnostic and treatment cycle and therefore reduced LOS for a $1 million savings
- Eliminated lost or mislaid charts
- Reduced turnaround time for ambulatory test results.

Accurate Information
- Billing denial rate has dropped from 23 to 10%

Simplified and consistent processes
- 80% of patients are on a clinical pathway

Achievement of corporate objectives
- Staff turnover under 4%
- Dictation annual savings of almost $400,000
- Annual reduction in coding costs of $100,000
- Consolidation of nurse management $75,000
- Reduction in paper and forms costs - Documentation in progress
- Reduction of MR staff, improved chart completion - Documentation in progress
- Reduction in billing costs- Documentation in progress
- Improvement of co-insurance collections - Documentation in progress

Physician benefits include:
- Increase revenue from better E&M coding
- Reduction in transcription costs
- Access to patient record anywhere, any time

Case Study 2

Technology Transformation at a Public-Private Hospital Merger

A private not-for-profit academic medical center and a public hospital merged in 1996. The organization is now licensed for 547 beds with about 50% of the patients insured by Medicaid and Medicare covering another 25%. Providers include over 1136 attending physicians, but as an academic teaching hospital, much of the patient care is provided by interns and residents. There is well recognized medical research program.   All providers and other staff have access to the EHR and it is currently used by over 90% of the providers. Data entry is done by less that half of the providers, but is expected to increase as additional nursing and physician functions are added. The hospital and ambulatory clinics are mostly paperless.

The organizational strategy to consolidate services to reduce cost, improve, efficiency, and optimize the patient experience was directly supported by the IT consolidation plans that halved the number of supported systems. Technology was the cornerstone of the merger and enabled the hospital to reap the benefits of consolidation. The technology allowed them to:
- Achieve a virtual consolidation where a physical consolidation was impractical
- Improve efficiency by eliminating process steps
- Increase patient safety by streamlining processes and providing real-time decision support.

The goals of the EHR project were not separated from the strategic goals articulated by the organizations' executives, rather the EHR was a tactic by which to achieve the objectives. In 1997 and 1998, the EMR was presented and discussed in board planning sessions, leadership meeting, and administrative sessions. The project was overseen by a steering committee that included the CMO, CIO , CFO, CNO and Ancillary Services VP.   A policy and organizations committee was formed to provide clinical governance for the project.

Key Success Factors
- Their focus on improved efficiency and safety created the logical steps to move to a paperless record, but paperless was not a goal within itself.
  - Project began with data entered online and production of hardcopy reports
  - After inpatient and outpatient repositories were implemented (beginning of 2004) they realized they could go paperless by scanning the remaining non-electronic documents into a document database.
- To drive the patient safety goal, they adhered to a policy of direct clinician entry.
- EHR was built incrementally; both the functions and the user groups were segmented into discrete steps.
- Pilots for each component of the EHR were the standard implementation process and this improved subsequent implementations.
- Two physicians were placed on the project payroll and physician champions were paid for the portion of their time they devoted to the project.
- There were a set of principles to provide for a standard implementation foundation including minimizing duration of having both paper and automated processes and embracing incremental improvements.
- Encouraged standardization practices but allowed for customization to support the unique nature of service/care teams.
- Training strategy was tailored to each application with every attempt made to minimize the time spent in the classroom.

Scope
- In 1998, the organization signed a contract to address the core clinical functionality in the hospitals and ambulatory settings.

- The inpatient functions were implemented in a four year timeframe beginning in 2000. Functions included:
    o Results data generated by the ancillary departments incrementally added to include most ancillaries and discharge summaries, operative notes and ED notes
    o CPOE of 100% of the inpatient orders
    o Electronic Medication Administrator Records.
    o Next phase includes nursing and physician documentation.
- The ambulatory functions began with early adopters in 1999 and by 2003 was completed in 60 clinics representing 79 locations. Functions include:
    o Visit Documentation by providers to update problem list, medication, allergies and creation of a summary note
- Integrated inpatient and ambulatory repositories through a common desktop standard. Used a common MPI to synchronize clinical and administrative systems including images.

Costs

Funding secured based on the premise that only from an EHR could the new organization standardize processes to reduce expense and optimize safety. Their projected costs of $22 million over 5 years, underestimated the implementation costs.

Lessons Learned.

- Implementation required more staff than anticipated
- Network infrastructure costs were higher than planned
- Geographic rather than service focus allowed them to reduce the impact of having both automated and paper orders within the same unit
- More focused training needed for CPOE to explain the importance of structured data fields.
- Reports made available to clinical leadership to monitor actual practice against hospital policy.
- Conducted focus group and solicited feedback
- Ensured value-added for clinicians in each phase of the system implementation
- To encourage clinician acceptance permitted more customization than was desired. Currently, re-introducing standard approaches to improve quality of data for reporting and measurement.

Value

Standardization has improved the efficiency and reliability of the record and benefited the care delivery process. No formal ROI was forecast, but savings have been realized including:
Efficiency & Standardization
- Eliminated redundant processes in major ancillaries produced staff savings even as the volume increased. 7 FTEs were reassigned to more clinically meaningful tasks.
- Reduced the number of hardcopy chart deliveries resulted in a 28.5 FTE ($775,000) savings in Medical Records
- Reduced steps of medication administration from 15 to 9.
- Alerts notify physicians of acceptable state sponsored medications eliminating re-work for physicians, pharmacists and patients
- IV to PO savings estimated to be $108,000 annually.
- Electronic ambulatory records reduced $100,000 in printing coast annually
- Filing cost performed by outsourcing arrangement reduced costs $200,000 annually.
- Eliminated $210,000 revenue loss from denied claims due to lack of supporting documentation.
Patient Safety
- 80% of medications verified within 30 minutes or orders increased from the baseline of 60%
- Reduced medication errors from 11.8 per 1000 patient days to 2.5 per 1000 patient days
- Medication list is up to date and available at discharge and for the ED
- Increased compliance with 'best practice" based on AHA Guidelines
- Elimination of transcription errors through use of eMAR
- Problem list are updated because they are guaranteed to be reliably available to the clinician on the next visit.

Case Study 3

The Journey Towards a Destination of Quality Patient Care

A large health care network comprising three acute-care hospitals, three diagnostic and treatment centers, and 38 family health care centers began a journey to an electronic health record in 1997. The population served is low income and multi-cultural. Their statistics include over 2,400 providers, 56,000 discharges, 1, 226,000 ambulatory visits and 310,000 ED visits annually.   The organization transitioned from a paper to an electronic health record.

The vision for the EHR was to integrate information and make it accessible. The goals included:
- Improve the quality and safety of patient care
- Improve access to patient information
- Enhance productivity
- Provide date for decision making
- Reduce costs
- Improve revenue.

The Board and the presidents of the corporation planned, approved, championed and directed the implementation of the EHR. The Senior VP of one of the hospitals directed the implementation. The Steering Committee included the senior staf, medical directors, chairs of medical informatics and HIM and IS leadership. The role of the CEO was critical to the success of the HR implementation and helped guarantee participation and collaboration of the senior staff. The CEO had the final word on priorities, allocation of resources, approval of policies, and quality of the implementation process. Clinicians including physicians, nurses, social workers, pharmacist, radiology and laboratory technicians, dieticians, respiratory, physical and occupational therapists participated in the planning and oversight of the EHR project.

Key Success Factors
- The role of CEO as a technology champion was critical to the success.
- The commitment of senior leadership to the implementation of the EHR underscored to the clinicians that use was not optional.
- The Implementation team members had clinical backgrounds.
- Re-engineering of complex processes through the use of the EHR was recognized by all key stakeholders.
- As they transitioned, they documented, "what was online and what was on paper".
- The focused on preparation and support of system users.
- Implemented Standard data definitions and terminology.
- Ensured adequate deployment of fixed workstations and wireless workstations.
- Staff expert supported the EHR users.
- Physicians, nurses and other caregivers played an active role and were aware of the value of the EHR.
- CIO proposed projects which were then evaluated with regard to their impact on patient care, the planned expenditures, and the anticipated ROI
- Targeted specific process improvements including consolidate lab, paperless/filmless radiology, improve patient safety through CPOE and integrated medication management, Improved work process for ED, OR, managed care, guest relations and quality management.

Scope
- Implemented 3 hospitals including inpatient, outpatient, emergency department, and 38 family health centers. Began implementation in 1999. By 2004 system included order entry including full

use of CPOE, Lab, Radiology, Pharmacy, Nursing assessment, interdisciplinary care planning, problem lists, operative reports, discharge summary, patient acuity, OR system, ED system, integrated medication management, and ambulatory notes.
- Rules and standards guide physician at time of order entry.
- In process is voice and handwriting recognition for clinical notes, and integration of historic scanned documents and patient photos

Costs

Proposed $54 million over 10 years of capital cost and $600,000 in annually operating costs with a projected return of $113,000,000. (1998-2007). Actual cost to FY 2004 is $52 million.

Lessons Learned
- Centralization of leadership processes expedited the phase of installation
- Underestimated the number of workstations and printers
- Needed to add more staff to handle customer service calls

Value
Savings
- Reduced system maintenance cost with integrated solution
- Radiology and Operative transcription cost eliminated by voice recognition ($600,000 annually)
- Decreased printing eliminate, 1 FTE from computer operations
- Reduction in lab testing (30% or $95 per discharge), but not radiology
- 50% reduction in time nurses spend in medication admistration
- Dietary cost reduce by $2.00/tray
- 45 FTE reduction in Medical Records
- Data entry personnled keying charge tickets reduced by 3 FTEs
- Reduction in forms for $1.20 reduction per discharge and $.30/visit
- LOS reduced by .7 days resulting in savings of $6 million
- Case mix index increased by 15% resulting in increased revenue of $12 million in 2003.

Simplified and consistent processes
- Consolidate laboratories
- Move to paperless/filmless radiology
- Reduced time of medication administration by almost 50%
- Improved ED workflow

Patient Safety
- 40% reduction in medication errors 12 months after CPOE
- Reduced nursing medication administration errors
- Improved quality and availability of summary/problem list, nursing assessments, screenings, interdisciplinary care plans, operative reports, discharge summaries and health maintenance record reminder

Achievement of corporate objectives
- Improved screening for smoking
- Improved criteria for screening colonoscopies

Case Study 4

"The Vision Comes to Life"

An 828-bed regional medical center with inpatient, outpatient, home health, and long term care services installed an electronic medical record that is now used by all care providers and administrative staff who access patient information. The organization includes the hospital, 12 affiliated physician offices, and 9 outpatient center including a surgery center, home care and skilled nursing. Providers included 765 physicians and 2827 nurses. Annual inpatients are 33,000, outpatient visits are 277,000 and 120,335 home care admissions. There are over 4000 active users at the hospital, satellite locations, and doctor's offices.

Approval and funding for the project was by the Board. The Steering Committed was lead by the CNO and included the CMO, Medical Chief of Staff, CIO and Project Director. The decision was made early on that this project would be driven by clinicians.

Financial returns were not the prime motivator for the electronic record—the ability to dramatically improve quality and safety was the guiding force. Traditional ROI projection was not done but extensive saving were anticipated through the new level of efficiency afforded by an EHR. Qualitative improvement goals included:
- Increased accuracy
- Access to chart
- Improved data integrity and security
- Reduced turnaround time for test
- Increased MD, staff, and patient satisfaction
- Reduce LOA

Quantitative goals included:
- Reduced distribution time for MR
- Reduced time spent in auditing charts and labor costs associated with concurrent review
- Reduced paper/form costs
- Reduced time spent in documenting care
- Reduced time in order entry
- Reduced duplicate testing
- Reduced overtime costs

Key Success Factors
- Clinical Advisory Group including manager/directors from major ancillaries provided oversight and prevented departments from making independent purchasing decision for clinical applications/devices.
- Hospital "sold" itself to the vendor as a hospital that was a perfect partner for a clinical system.
- Instituted risk management to identify, track and resolve identified risks.
- There were a set of guiding principles including:
  - Data entered into a system must be retrievable
  - Ability to access data remotely
  - No one person would hold all of the knowledge
  - And a number of others relating to the organization, vendor and technical support
- Full time dedicated team to staff, configure, and implement the EHR
  - PMT members were experts in their field, well respected, and were also able to see the big picture
  - PMT and implementation team members became a new department of Clinical System that continues to support the system (25 people)
- Active physician group but no formal incentive structure. Offered rewards such as PDAs.
- Workflow analysis was performed to optimize system use and revisited after going live.
- Piloted on a model, (empty patient care unit), pilot staff was vetted in a very formal process, and clinicians led roll out.

- Established a mechanism to streamline decisions making by allowing implementation staff to call a meeting to assemble others with authority 15 and then make a decision within 15 minutes.
- Emphasized fun and camaraderie in informal sessions and parties.

Scope
- The contracted was signed in 1996 and the first pilot began in 1997.
- The hospital is essentially paperless. Functions included:
  - Results data generated by the ancillary departments
  - Order entry and CPOE by over 50% of physicians
  - Real-time decision support during order entry
  - Clinical Pathways
  - Flow sheets, progress notes, problems list, allergy lists, assessments
  - Electronic signature
  - Physician transcription
  - Next steps include full CPOE by 2005, structured clinical documentation, OR and single sign-on

Costs
The initial Capital Cost was $4.5 million with an additional cost per year of $1.85 per year for implementation support and $1.5 million for ongoing support (7 years to-date). Benefits are over $10 million in enhanced revenue and $1 million in cost savings.

Lessons Learned
- Lack of reliability infrastructure caused hospital to back off from mandated CPOE (non-staff physicians). Beginning in Fall 2003, CPOE mandate was "re-introduced" with an expected completion of early 2005.
- Added 2 physicians to Clinical Systems Department.

Value
EHR has brought the hospital advances in safety, efficiency, quality, timeliness, and reporting. Specific savings including:

Patient Safety/Quality of Care
- Reduced ADE's
- Updated allergy lists
- Adherence to "best practices" for DRGs using order sets
- Communications across disciplines with interdisciplinary care plans
- Consistent documentation

Financial – Cost
- Medication changed from IV to PO for an estimated $123,000 in annual savings
- Therapeutic drug interchanges for an annual savings of $52,000
- Reduction of paper costs of approximately $400,000
- Process redesign has reduced staff costs $140,000

Financial – Revenue
- Reduced claim denials for a savings of $36,000 annually
- Recovery of unpaid accounts $9 million over 3 years
- Increased accuracy of room accommodation charge added $1 million per year.

Productivity
- Reduced duplicate orders
- Reduced inappropriate testing
- Improved case management
- Improved documentation compliance
- Reduce time of radiology result from 517 to 79 minutes

Satisfaction
- 100% of the physicians use the system for review and/or documentation
- Nursing turnover is less than Florida hospitals and nationwide (11.7% in 2001)