



Driving ROI and Improving Patient Care through Performance Management

Customer Case Study: Denver Health and Hospital Authority

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Denver Health and Hospital Authority (Denver Health) includes a 500-bed main hospital, a 911 medical response system, a network of family and school-based health centers, public health resources, and a Level I Trauma Center. Much of the health system's success in the past 15 years is due to its early adoption of information technology (IT) — spending more than \$230 million in less than 10 years. The primary reason for this capital expenditure was to overhaul outdated systems and update all hardware and software to improve IT support in the hospital and thus improve productivity of clinical and non-clinical employees.



An Integrated Systems Approach

After implementing significant hardware and software updates, Denver Health's IT department recognized that to reach the next level and transform its function into one that added measurable ROI value, it needed an integrated systems approach to clinical and non-clinical patient care. For this work, Denver Health's executives selected Siemens Medical Solutions—an innovative outside organization that it trusted, and one that would select core areas of improvement, identify and develop metrics, and work collaboratively throughout the process.

For Denver Health, working with the Global Services division of Siemens to develop and integrate groundbreaking Performance Management projects provided an opportunity to improve overall patient care and satisfaction while remaining fiscally sound. With healthcare costs rising at double digit levels, failure to embark on this process would impact the hospital system's ability to continue to be the region's primary safety net provider.



“Siemens helped us realize that in order to advance productivity, increase our ROI, and improve the quality of patient care here at Denver Health, we needed to approach the use of information technology differently than we had in the past.”

Gregg Veltri
Chief Information Officer
Denver Health

Projects with Direct Impact on ROI

The Denver Health/Siemens Global Services team identified seven key projects that would have the most direct impact on ROI. The team also identified four or five metrics applicable to each project that would allow it to measure progress toward the predetermined goals.

The seven core areas include:

- Computerized Provider Order Entry (CPOE)
- Picture Archiving and Communication System (PACS)
- Electronic (Enterprise) Document Management (EDM)
- Enterprise Identification Management (EIM)
- Medication Administration
- Bed Management
- Time and Attendance

Siemens is helping to drive the analysis on all seven core areas, including those that are non-Siemens solutions. Of the seven, Denver Health is using solutions from Siemens in its CPOE, EDM, EIM, and Medication Administration areas.

The joint team identified the key project success factors as:

- enable existing systems to become 100% operational and effective;
- drive the systems' financial performance;
- successfully implement clinical systems;
- successfully propel IT into a business driver;
- create a culture of clinicians and operations working as partners, not adversaries.

And, specific to the Performance Management project, Denver Health's goals are to:

- develop and implement a replicable, sustainable methodology;
- produce statistically valid analysis of chosen metrics across the seven major initiatives;
- transfer knowledge from Siemens to the Denver Health IT staff regarding choosing metrics and analysis methodology;
- create a peer-reviewed publication of the project as a model for other healthcare systems.

CPOE, Largest Positive Impact on Patient Care

Denver Health felt CPOE would have the largest positive impact on patient care as well as the hospital's internal culture. For that reason, CPOE was identified as the lead project. To facilitate the project's adoption internally, the team led educational sessions to show what was expected of all employees who would have input to and use the new systems. The team also managed expectations of the time it would take to achieve the desired outcomes.

“We recognized very early on that clinical workflow is a dynamic process and must be flexible based on the needs of the patient population and the clinicians that deliver care, as well as the constantly evolving knowledge base in medicine and healthcare,” says Gregg Veltri, Chief Information Officer, Denver Health. “We made sure to involve as many physicians, nurses, and clinicians as possible as we planned our implementation and roll outs, which we felt would be a key factor for our success.”

Reducing Risks, Improving Efficiency

Denver Health expects to see many positive results from its use of the INVISION® CPOE solution from Siemens including:

- Reduced potential for human error
- Reduced time to care
- Improved order accuracy and quicker order confirmation turn-around time
- Improved clinical decision support at the point of care
- Improved availability of crucial information
- Improved communication between physicians, nurses, pharmacists, and patients

Through CPOE use, Denver Health could rid itself of its traditional manual system – one that was a lengthy process involving a nurse's review of a physician's handwritten prescription order; the nurse sending a chart copy to a pharmacist for overview, verification of the order, and dispensing of the medication by the pharmacist; and finally the nurse verifying the right drug, dose, route, time, and patient.

Obtaining Staff Buy-in

Denver Health recognized the need to involve physicians, nurses, and other clinicians in the development, planning, and roll out. "We knew that there was no way we could be successful without the support of our staff members," says Mary Beth Haugen, director of IS Applications and HIM for Denver Health. "We made sure to involve them every step of the way and provide them with avenues for feedback as we moved through our roll outs."

As a result, Denver Health and Siemens Global Services worked together to develop a plan for staff participation. First, the team worked to form CPOE workgroups, which included physicians, nurses, IT staff, and other relevant parties. Following the initial implementation of Denver Health's new CPOE system, these multidisciplinary workgroups were tasked with determining roll-out strategy and timelines.

"We established one CPOE workgroup that served as the main governing body," says Haugen. "Then, we formed various subgroups that reported into our main workgroup and worked to gather and provide critical feedback on the system and roll outs. We tried to create as many subgroups as possible to ensure we were gathering input from everyone who would have exposure to the system. This included nurses, pharmacists, laboratory technologists, other clinicians, and on and on."

Better Communication, Faster Results

Siemens then brought in various clinical resources who understood the challenges clinicians and physicians might face when using a new computerized system and who could anticipate some of the skepticism that might arise. These resources worked to meet with staff members and speak with them on their levels about how the system could help them provide better quality of care and become better physicians and clinicians.

Following the solidification of strategy and roll-out timelines, Denver Health and Siemens Global Services worked quickly to begin educating all staff members on the benefits of the new system. Initially, training and education sessions were conducted on an ad-hoc basis, once or twice a month. The team realized that this was not the best training model for Denver Health and quickly began executing more one-on-one classroom training and relied heavily on the onsite Siemens clinical resources for assistance with training and championing the CPOE system.

The new training model and use of clinical resources proved extremely successful. Denver Health witnessed an improvement in workflow, more fluid physician communication, and faster results. Although adding clinical resources to training programs had been done in the past, Denver Health maximized this model and reaped many benefits as a result.



Performance Management Project Results

- 54% reduction in time to care with laboratory results availability
- 62% reduction in time to care with radiology results availability
- 83% reduction in time to care with medication availability

Hospital Unit Roll Out & Challenges

In mid-2003, Denver Health and Siemens began rolling out INVISION CPOE throughout the hospital. Denver Health took a cautious approach, and by the end of 2007, CPOE was live in eleven of their units. The roll-out encompassed:

- Medical Intensive Care Unit (MICU) – Pilot, July 2003
- Step-down Unit – July, 2004
- Surgical Intensive Care Unit (SICU) – December, 2005
- Medical Surgical Unit 3 – January, 2006
- Medical Surgical Unit 4 – January, 2006
- Medical Surgical Unit 8East – April, 2006
- Medical Surgical unit 9East – April, 2006
- Rehabilitation Unit 8 – April, 2006
- Correctional Care Medical Facility – May, 2006
- Behavioral Health Units – September, 2006
- Mom-Baby and Labor & Delivery – September, 2007

The pilot program in the MICU proved the most challenging for the team due to the MICU's ever-changing and demanding environment. Additionally, the MICU had recently been relocated in the hospital. Not only did the staff members find themselves adapting to a new building, but they also had to acclimate themselves to new workflows, in addition to the new CPOE system. The Denver Health and Siemens Global Services team was very hands-on during this roll out and viewed the pilot as a learning lesson for future projects.

Denver Health and Siemens experienced other minor bumps throughout the roll-out process but always worked quickly to correct and improve issues. In addition to training assistance, the Siemens Global Services onsite clinical resources worked with staff to develop various order sets and process designs as each roll out was completed.

Denver Health and Siemens also worked to quickly implement rebuilds to the system throughout the roll outs to better suit Denver Health's environment. For example, in June 2005, the team executed a pharmacy rebuild during which it modified all screens on the CPOE units. Through this modification, the prescription order entry process was streamlined, enabling nurses to make fewer phone calls for order clarification.

User-Friendly System with Positive Outcomes

"We have been very pleased with the results we've seen thus far," says Haugen. "All our staff members have been very supportive throughout the roll-out process. It's been extremely encouraging to hear our physicians and nurses tell us how user-friendly the system is and how it has helped them to do their jobs more efficiently and effectively."

Preliminary results have been very encouraging and the team is confident it will continue to experience many successes as it moves forward with its CPOE roll out and overall Performance Management project. Preliminary successes have already been demonstrated: Following the roll out to one of Denver Health's medical-surgical units, Denver Health experienced a 54% reduction in time to care with laboratory results availability, a 62% reduction in time to care with radiology results availability, and an 83% reduction in time to care with medication availability.

Ongoing Roll Out and Continued Performance Management

Denver Health is currently continuing its INVISION CPOE roll out to other units and the various workgroups still remain a large part of the process. Additionally, Denver Health has taken over the entire CPOE training program. The hospital currently employs four staff members who are dedicated to conducting educational sessions and one-on-one training for new clinical applications.

Denver Health looks forward to the very near future when CPOE will be live across its entire enterprise. The team plans to complete roll out to Pediatrics, PICU, and NICU in January, 2008. Performance Management will continue to play an integral role in the selection and implementation of all future applications and upgrades at Denver Health.

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