Texas Children’s Hospital & Catalyst

An Enterprise Data Warehouse and Advanced Analytics Prove Critical to Improving Quality at Texas Children’s Hospital
**The Challenge**

In 2006, with the impending transition to value-based reimbursement on the horizon, Texas Children’s began to examine the link between its robust quality improvement initiatives and its data management capabilities. To succeed under a value-based system, the hospital’s leaders knew they needed the ability to analyze and better manage specific populations of patients, especially those most-costly patients with chronic problems such as asthma. They also knew they needed to root out every vestige of inefficiency and waste in their care programs. But they lacked the hard data to pinpoint the suspected problems and to uncover other, hidden inefficiencies and safety issues that could make it harder to share financial risk for their patients’ health under value-based reimbursement.

To address this challenge, Texas Children’s launched an overall quality and safety strategy in mid-2006 whose goal was to develop a comprehensive and integrated enterprise-wide data management infrastructure. Starting with the implementation of an electronic health record (EHR) from Epic, the hospital moved to collect raw clinical and financial data from across its enterprise and transform it into the meaningful information needed to guide its clinical quality interventions and waste reduction efforts.

**Bumps in the Road**

Almost immediately, the hospital confronted technological and cultural barriers typical of hospitals everywhere. Organizational silos dividing clinicians and data managers hampered communication and teamwork. And the EHR’s rich digital data proved difficult to translate into a bird’s eye view of specific patient populations, procedures and problems.

“Our clinicians thought that the EHR was a silver bullet to get the data they needed (for quality improvement) and they blamed IT when the information wasn’t forthcoming,” recalls Myra Davis, MSE, Vice President of Information Services for Texas Children’s Hospital. “The comment I would hear is, ‘I can’t get the right data from them,’” or ‘they don’t understand what I need from them.’ It created nothing but frustration. There was complete ignorance about the roles everyone needed to play in improving quality.”

Leaders of quality, clinical and IT departments at Texas Children’s knew the solution was to nurture a truly data-driven clinical culture at the hospital. Since clinicians are scientists by training, it was hoped they would respond well to data showing a direct correlation between their behavior and patient outcomes.

To help nurture this new data-centric culture, Texas Children’s decided to roll out a distinctly different, clinically-driven Enterprise Data Warehouse (EDW) and new methodology to help it measure care and population health outcomes. Beginning in September, 2011, the hospital worked with Healthcare Quality Catalyst (Catalyst) to implement a clinical and analytic framework that would:

- Implement an adaptive data warehouse platform and advanced analytics to collect data from systems inside and outside of the enterprise in order to report on a variety of short-term operational, and clinical needs as well as reporting requirements related to impending healthcare reform and shared-risk payment models.
- Organize permanent, integrated teams of clinicians, technologists, analysts and quality personnel to build evidence-based care guidelines into the care delivery workflow.
- Implement a measurement system infrastructure to better track and interpret iterative improvement—a tactic that Texas Children’s found critical to sustain improvements.

Implementation of the Catalyst Adaptive Data Warehouse was completed in just three months – a “phenomenally fast time,” according to Texas Children’s Hospital Director of Quality and Clinical Systems Integration Margaret Holm. Simultaneously, Catalyst began conducting its key process analysis, a data-driven, financial and clinical assessment across TCH looking at variability of care and resource consumption. The assessment results were provided to a multi-disciplinary hospital team that weighed in on the data and chose to focus its quality improvement efforts on asthma and appendectomy care.

A second cross-functional team was hand-picked to assess and manage acute asthma in the hospital from the time of presentation in the Emergency Department to discharge. Just weeks into the project, the team used the fount of new data at its disposal to identify a significant number of unnecessary chest X-rays that were being administered to asthma patients. Texas Children’s pediatricians were ordering chest X-rays for nearly 60% of patients despite evidence-based guidelines that indicated the tests were necessary in just 5% of cases.

Texas Children’s physicians initially reacted to this news in predictable fashion, recalled Charles Macias, MD, MPH, Associate Professor of Pediatrics and Director of the Center for Clinical Effectiveness and Evidence Based Outcomes at Baylor College of Medicine. “They said, oh no, that can’t be due to our behavior, the data must be wrong. But unlike in the past, Catalyst enabled us to drill down into near real-time data to reveal..."
patterns and convince them they were indeed responsible. The epiphany for people was that we weren’t really performing in general as well as we thought we were.”

Texas Children’s asthma team acted quickly to address the issue by providing education and analytics dashboards for the clinical staff to monitor X-ray procedures. In just 1-1/2 months, the team produced a 15% reduction in unnecessary chest X-rays. A more formal statistical analysis in the months since then confirmed the trend of X-ray reductions.

Appendectomy Care

Results are similarly promising from Catalyst’s second focus area at Texas Children’s – appendectomy care. Appendicitis is the most common indication for abdominal surgery in children, accounting for one-third of all childhood admissions for abdominal pain. At Texas Children’s, the appendectomy team created in partnership with Catalyst aimed to identify and reduce length of stay, unplanned readmissions, time from diagnosis to treatment, and surgical site infections.

Still in its early stages, the appendectomy program has encouraged clinicians to use the data to better understand their patient population and build more appropriate care delivery processes. For instance, according to Holm, Catalyst data revealed hitherto unknown and significant differences in outcomes between simple cases of appendicitis and more complex cases. As a result, the appendectomy care process team is focusing on moving simple cases through the care process more efficiently rather than treating both simple and complex cases the same.

One early result from the program is a 60 percent increase in the use of the most appropriate antibiotic to control appendectomy-related infections.

Expanding the Scope

“Our ability to very rapidly reduce unnecessary X-rays and increase use of the appropriate antibiotic for appendectomy patients gave us confidence that we could use the Catalyst technology and process to change more important outcomes like length of stay,” said Dr. Robert Moore, Assoc. Professor of Pediatrics in the division of pediatric pulmonary medicine at Baylor College of Medicine.

Catalyst gives the asthma team the ability to analyze data on demand as opposed to 6-months later. Armed with this near-real-time data, the asthma team is drilling down into specific interventions such as the delay between the time a child walks in the ED door and the time they receive the appropriate asthma medications.

“Those are the kinds of things that you want to see happen in short time frames because they really make a difference in terms of length of stay or even whether a patient has to be admitted,” said Dr. Moore. “If we can make that the most efficient it can possibly be, then we think we can reduce length of stays on the front end as well as reduce readmissions on the back end.”

Texas Children’s early success with asthma has encouraged the hospital to expand its Catalyst deployment to include multiple medical and surgical programs and processes. “We’re working with Catalyst to add chronic asthma, cardiology and pneumonia as well as other conditions or diseases,” explained Holm. “The culture is changing and it’s all happening very fast.”

Today, Texas Children’s clinicians are more engaged and enthusiastic about data-driven care improvement, said Holm. Now, clinicians are actively using the data to improve care for patients by asking better questions about how care is delivered and uncovering the root causes of variation. In turn, rapid clinical feedback has proven critical to reduce the development time required by technicians and analysts to build out the advanced analytics that are necessary to monitor and sustain improvements.

For Davis, the direct involvement of clinicians in the analysis and transformation of data is a breath of fresh air. “A huge measure of Catalyst’s success is that I know their teams are still here engaging with our clinicians and yet our department isn’t involved,” she said. “Which means we’ve succeeded in getting our clinical teams to engage directly with the data and learn from the data. Every time I hear how the EDW is referenced by clinicians and how the organization is using a rich repository of data to improve quality outcomes, all I can do is smile and say, wow, mission accomplished.”

Future Directions

While the process improvements in asthma are still in their early stages, Texas Children’s expectations have risen that they will find similar opportunities across other areas of care. The hospital expects the active use of transformed clinical data to continue to increase, resulting in a reduction of the cycle time for clinical process improvements. The future goals for Texas Children’s quality improvement effort include providing near real-time process and outcome metrics, standardizing in the delivery of evidence-based care, enhancing gains in operational efficiencies and clinical effectiveness, increasing utilization of the tools by clinicians, and improving strategic alignment towards managing populations.

“Today, we have a solution that integrates data management with evidence-based practice, operational data and financial metrics to allow us to understand the bigger scope of care delivery,” said Dr. Macias. “We have never had the opportunity to do that before because so many silos of data existed. Now we can put patients first because we can see the data.”
About Texas Children’s Hospital

Texas Children’s Hospital is internationally renowned for caring for children in the United States and in other countries. US News & World Report ranked it the nation’s fourth best children’s hospital and the best in Texas in 2012. Founded in 1951, Texas Children’s resides in the largest medical complex in the world -- Texas Medical Center in Houston -- and provides primary and tertiary care for children through the hospital, affiliated practices and health plans. Together, these facilities manage more than 1 million patient encounters each year.

At the core of Texas Children’s success lies its commitment to raise the quality of patient care in part by implementing evidence-based care guidelines. In partnership with its academic partner, Baylor College of Medicine, the hospital is committed to meeting the Institute of Medicine’s goal of providing care that is safe, equitable, effective, patient-centered, timely and efficient. As a result, Texas Children’s has invested heavily in information systems that enable the delivery of higher quality, lower cost patient care.

About Health Catalyst

Catalyst provides data warehousing solutions that actually work in today’s rapidly changing healthcare environment. Catalyst is on a mission to transform healthcare in the U.S. by utilizing its next-generation data warehousing solutions to accelerate care improvement for all types of healthcare systems. Helping hospitals and health systems to create a data-driven approach to care, Catalyst provides clinical, IT and financial executives with the tools and technologies necessary to improve care by reducing costs. Clients include Allina Hospitals and Clinics, MultiCare Health Systems, North Memorial Health Care, Stanford Hospital and Clinics, Texas Children’s Hospital, and Providence Health & Services.

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