

# Launching an Enterprise Data Warehouse to Rapidly Reduce Waste in Asthma Care



**Texas Children's Hospital**<sup>®</sup>

## HEALTHCARE ORGANIZATION

Children's Hospital

## TOP RESULTS

- Decreased average length of stay by 11 hours
- Achieved and sustained a 49% decrease in unnecessary chest X-ray orders
- 80% order set utilization- a 67% sustained increase over 8 months
- 90% usage of asthma action plan by providers

## PRODUCTS

- Late-Binding™ Data Warehouse
- Key Process Analysis Application
- Population Analytics Advanced Application- Asthma Module

## SERVICES

- Installation Services
- Clinical Improvement Services



**TEXAS CHILDREN'S HOSPITAL** (TCH) a not-for-profit organization consistently ranked among the top children's hospitals in the nation, has always looked for ways to improve the quality and efficiency of its patient care. Quality and efficiency have become even more important to the hospital amid the impending transformation of the reimbursement system from fee-for-service to value-based payments. TCH is moving from cost-based reimbursement for Medicaid to a form of value-based payment under which hospitals that improve efficiency can keep the savings.



It's one thing to establish an order set and another to actually drive its adoption. Seeing how well this process works—how well and how quickly our clinical improvement teams and evidence-based care experts are able to encourage clinicians across our organization to standardize processes—is very gratifying.

Dr. Charles Macias, Attending Physician  
Director, Evidence Based Outcomes Center

To succeed under the new payment system, TCH leaders needed the ability to analyze and better manage specific populations of patients, especially those

with costly, chronic conditions like asthma. This requires the ability to identify and improve areas of inefficiency and waste in care programs, operations and administrative services.

TCH turned to a technology-driven approach to enabling its clinicians to deliver higher-quality and lower-cost patient care. The hospital worked with Health Catalyst® to implement a clinical, analytic and process-based framework for value-based transformation. This framework:

- Improves measurement and analytics
- Creates permanent cross-functional workgroup teams focused on identifying, deploying and monitoring the effectiveness of quality improvements
- Deploys a data-driven approach to implementing clinical best practices

Read below to learn how this approach is transforming asthma care at TCH.

### THE EHR: A NECESSARY FIRST STEP (BUT NOT ENOUGH)

Texas Children's leaders were convinced that technology could play a key role in improving the quality and coordination of care among its patient population. Hoping it would transform raw clinical and financial data into meaningful information the hospital could use in guiding its delivery of care and services, TCH began its implementation of an enterprise-wide electronic health record (EHR) in 2008.

The EHR has proved tremendously valuable as the means of digitizing care across the hospital. But, in reality, the newly digitized EHR data was hard to extract and combine with other data sources in a timely fashion. TCH found that it took between three and six months for analysts to deliver clear answers to key clinical and operational questions using EHR data. As a result, executives and clinicians were not able to effectively leverage the data to make data-driven, financially sustainable improvements in care for either individuals or specific populations.

TCH learned that while implementing an EHR is clearly a necessary step toward data-driven delivery of care, the EHR alone is not enough without an EDW that enables an enterprise-wide, consistent view of data from many sources.

### TECHNOLOGY AND CULTURE: THE ENTERPRISE DATA WAREHOUSE AND TEAM PROCESSES

After realizing that the EHR was not the silver bullet that had been expected, TCH leaders decided to take a bold, integrated approach to healthcare analytics, data management and quality improvement. Beginning in September 2011, the hospital worked with healthcare enterprise data warehouse (EDW) vendor Health Catalyst to implement a clinical, analytic and process-based framework for value-based transformation.

The framework first introduces an EDW to improve measurement and analytics throughout the organization. Health Catalyst's Late-Binding™ Data Warehouse platform is designed to handle the massive quantities of data in large healthcare organizations. The EDW organized TCH's data into a single source of truth that

“With EDW technology, advanced analytics applications and teams dedicated to improving clinical processes in a pragmatic, sustainable way, we are confident we can establish evidence-based care standards throughout our organization.

Dr. Charles Macias  
Attending Physician  
Director, Evidence Based  
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serves as a foundation for data-driven improvement. This technology enabled TCH to eliminate the manual data-gathering process and automate data distribution.

The EDW technology provided a necessary foundation. But TCH leaders also understood that technology alone wouldn't enable them to improve the overall value of care. Doing that would also require a fundamental culture change. So TCH implemented two additional aspects of the framework:

- Permanent, integrated workgroup teams that identify areas for care improvement and build evidence-based practices into the care delivery workflow.
- Advanced healthcare analytics applications that run on the EDW platform to prioritize, track and interpret iterative improvement.

TCH moved forward to put this framework into action, beginning with implementing the EDW. Implementation was completed in just three months—a “phenomenally fast time,” according to Margaret Holm, Ph.D., the hospital's Director of Quality and Clinical Systems Integration.

### PRIORITIZING IMPROVEMENTS: KEY PROCESS ANALYSIS

Historically, identifying care improvement opportunities that would have the greatest impact was a challenge for TCH. An advanced analytics application from Health Catalyst—called the Key Process Analysis (KPA) application—helped the hospital prioritize its quality improvement programs. Based on Pareto Analysis—a statistical technique that identifies the limited number of tasks that will produce the most significant overall effect—the KPA app analyzed EDW data to pinpoint variability in care and areas of high resource consumption throughout the hospital.

With this analysis in hand, TCH decided to begin its quality improvement efforts by focusing on asthma care. Asthma is the most common chronic disease among children. In fact, an estimated 80,000 children in Houston alone suffer from asthma. In 2011, asthma accounted for 3,000 emergency department (ED) visits and 800 hospital admissions at TCH.

### REDUCING UNNECESSARY X-RAYS FOR ASTHMA PATIENTS

As a first step toward better managing its asthma population, TCH established a cross-functional workgroup—called a clinical improvement team—consisting of physicians and nurses on the frontlines of care, as well as experts in patient safety, quality improvement, finance and IT. This team was assigned to assess and manage acute asthma from the time of arrival in the ED to discharge. Specifically, the team needed to determine how to pragmatically improve asthma care across hospital facilities. TCH's Evidence Based Outcomes Center (EBOC)—the entity that spearheads the hospital's efforts to make its clinical practice consistent with the best medical science—was on hand to support the team as it explored and implemented clinical best practices.

Using the wealth of new data at its disposal, the team discovered that a high volume of chest X-rays was being administered to asthma patients within the hospital. Rather than request an analyst's report to explain the cause, as they would have in the past, the team used the EDW's dashboards to immediately drill down into near real-time X-ray data. To their astonishment, they recognized

that, as a group, TCH physicians were ordering chest X-rays for 65 percent of their asthma patients—when evidence-based practice calls for an X-ray in only 5 percent of cases.

The IT experts in the workgroup traced the problem to a faulty order set within the hospital's EHR. Working with EBOC experts, the team developed a best practice for the order set, and the IT experts quickly rewrote the order set to reflect it.

## KEY CLINICAL QUALITY IMPROVEMENT RESULTS

Pinpointing concrete opportunities for improvement is a significant achievement but actually driving adoption of better care-delivery practices is an often difficult prospect. Thanks to the cross-functional team approach—which involves clinicians on the frontlines of care from the outset when determining the best ways to improve care delivery—TCH was able to drive significant adoption and measurable results.

### **Drove significant, measurable adoption of evidence-based order sets.**

TCH focused on promoting appropriate X-ray orders for asthma patients among its hospitalist group. Today, TCH physicians in the acute-care setting apply this evidence-based order set to approximately 80 percent of the asthma patients they treat. This represents a 67 percent increase—sustained for more than 8 months.

### **Decreased inpatient length of stay (LOS) for asthma patients by 11 hours.**

By utilizing evidence based practice across the continuum of care, TCH was able to significantly decrease LOS for these patients the prior year.

### **Achieved and sustained a 49 percent decrease in unnecessary chest X-ray orders.**

Within six months, the number of chest X-rays ordered for asthma patients had declined by 15 percent. Today, these orders have decreased by 49 percent.

### **Sustained 67% increase in order set utilization.**

Today, 80% of all providers utilize evidence-based order sets, a 67% sustained increase over 8 months.


### **Increased use of an EHR-based asthma action plan to 90 percent of physicians.**

In conjunction with the EBOC, the clinical improvement team developed evidence-based asthma action plans for clinicians to provide to patients and families. These plans are designed to help patients better manage their asthma and recognize when clinical intervention is required. Today, 90 percent of physicians treating asthma patients are distributing these action plans.

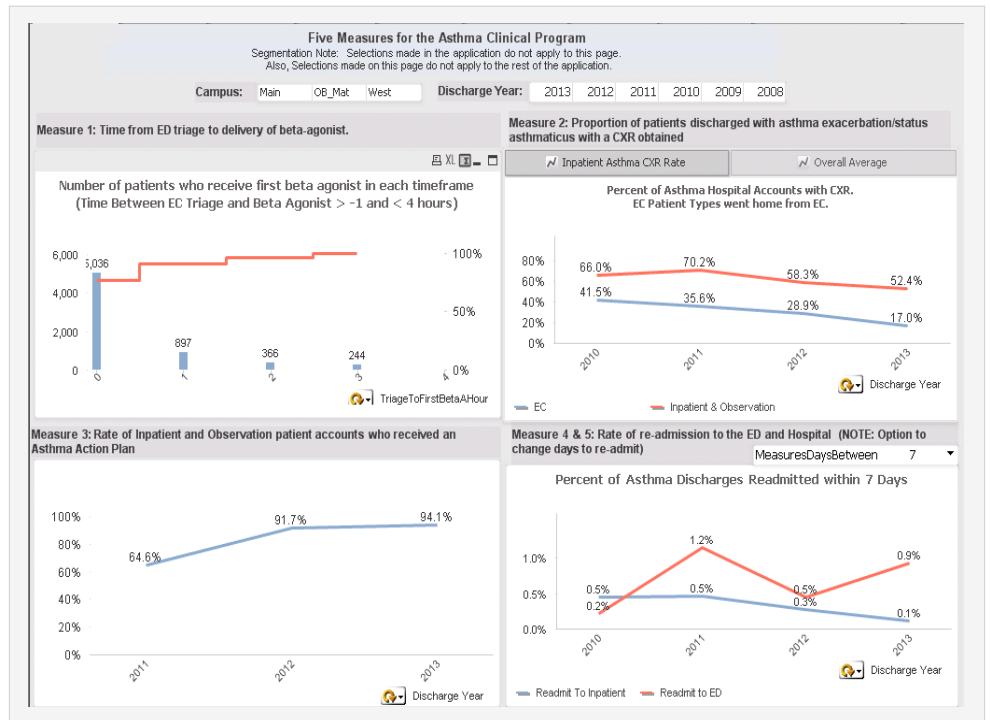
### **Established an effective, permanent clinical improvement team that continues to identify areas for care improvement and build evidence-based practices into the care delivery workflow.**

Because the clinical improvement team owns improvement for one particular care family—asthma—over the long-term, they were able to standardize excellence in this care delivery work process. They have since turned their attention to optimizing additional work processes. For example, they are now working to reduce the delay between the time a child walks into the ED and the time they receive the appropriate asthma medications.

## A PROVEN APPROACH FOR CONTINUED SUCCESS

The discovery of the prevalent, unnecessary use of X-rays was an early win for TCH to reduce unsafe testing and excess resource use and to align more fully with evidence-based care guidelines. This early success with asthma has encouraged TCH to expand its Health Catalyst deployment to include multiple medical and surgical programs and processes, including appendectomy, diabetic ketoacidosis and more. The hospital even plans to expand the program beyond hospital-based care to include its primary pediatric practices and clinic-based care. 

## SAMPLE ASTHMA MODULE VISUALIZATION



## ABOUT HEALTH CATALYST

Health Catalyst is a mission-driven data warehousing, analytics, and outcomes improvement company that helps healthcare organizations of all sizes perform the clinical, financial, and operational reporting and analysis needed for [population health](#) and [accountable care](#). Our proven enterprise data warehouse (EDW) and analytics platform helps improve quality, add efficiency and lower costs in support of more than 50 million patients for organizations ranging from the largest US health system to forward-thinking physician practices.

For more information, visit [www.healthcatalyst.com](http://www.healthcatalyst.com), and follow us on [Twitter](#), [LinkedIn](#), and [Facebook](#).