



**How the Most  
Successful Health  
Systems Use a  
Data and Analytics  
Platform to Drive  
Meaningful  
Improvement**

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Today's healthcare data status quo of black boxes and shallow insights too often keeps organizations from realizing the digital era's transformational potential. Without accessible, accurate, timely data, health systems struggle with challenges from patient outcomes and experience to profitability and, since 2020, COVID-19. Only with a commercial-grade data and analytics platform built exclusively for healthcare can organizations confidently scale analytics productivity to improve outcomes, respond to a crisis, and boost revenue.

Learn how the most successful health systems leverage a healthcare-specific data and analytics platform to enable systematic and repeatable improvements to quality, revenue, cost, and patient experience.

# \$74M in Healthcare Operational Improvements: How Texas Children's Hospital Is Delivering on Its Vision



Texas Children's Hospital is internationally renowned for delivering quality care to children. As a leading pediatric institution, the health system is dedicated to pioneering advancements in care that will benefit the worldwide pediatric community. According to CEO Mark Wallace, Texas Children's feels a tremendous responsibility to "accelerate the translation of research from bench to bedside, and to anticipate the future needs of children's health regionally, nationally and internationally."

## INVESTING IN THE FUTURE AND IMPROVING FINANCIAL PERFORMANCE

To provide high-level care to a broader population of patients and maintain its position at the leading edge of pediatric care, Texas Children's launched a \$1.5 billion strategy designed to support the expansion of clinical care, academics and research capabilities.

On the heels of this expansion effort, Texas Children's faced a significant inflection point. Federal and state funding reductions, along with increased competition, threatened the organization's profitability.

In fact, projections indicated they would fall \$50 million short of what was needed to build capital reserves and to maintain their bond rating.

To improve financial performance and prepare for the future, Texas Children's leadership team launched a system-wide performance improvement project called "Delivering on the Vision" (DOTV). DOTV would involve increasing accessibility for patients as well as driving healthcare operation savings. To achieve this vision, the health system would need to improve the quality of patient care, increase revenues and reduce costs.

## DATA-DRIVEN HEALTHCARE PERFORMANCE IMPROVEMENT

Texas Children's strategy for delivering on the vision encompassed, in part, the following efforts:

- Enhancing strategic decision-making by providing timely access to integrated data and a single source of truth
- Establishing a data-driven, transparent culture, where executives and clinicians collaborate to define and approve clinical and operational measures
- Increasing the accountability of leaders, providers and frontline managers for their clinical and operating performance
- In depth assessments of labor, non-labor, inpatient clinical operations, clinical documentation improvement and physician practice operations.

The common denominator in these efforts was a need for sustained, transparent, easily visualized data and measurement. Therefore, Texas Children's implemented a late-binding enterprise data warehouse (EDW) platform and healthcare

analytics applications from Health Catalyst. The EDW integrates data from the electronic health record (EHR), financial, operational and other systems across Texas Children's to create an enterprise-wide, single source of truth that informs clinical and operational decisions.

The EDW delivers quick and secure access to integrated, trusted data. Analytics applications running on the EDW give clinicians and staff access to needed information via easy-to-use dashboards. Access to trusted data has enabled a culture of transparency, driving system-wide engagement and accountability for clinical and operational results.

## RESULTS

The DOTV initiative is achieving real, measurable healthcare performance improvement.

### **\$74 million in operational improvements**

As part of the DOTV initiative, Texas Children's leaders established a goal of increasing operating margins over the course of 18 months with a target of \$60 million in savings. The organization has far surpassed this goal, realizing \$74 million in cost savings to date. These savings are the result of the systematic identification and execution of revenue generation and cost reduction improvements.

Using the EDW to complement their work, Texas Children's continued to identify several key performance improvement opportunity areas and executes focused interventions to drive operational savings. Key initiatives and their respective success include:

### ***Improvement Opportunity Area: Physician Services***

An initiative to improve practice management resulted in:

- 29 percent increase in capacity, physician throughput and schedule template utilization
- 36 percent decrease in no-show rates
- 16 percent increase in internal referral rates

### ***A complimentary initiative to improve provider productivity achieved:***

- 15 percent increase in provider productivity
- 39 percent increase in revenue per clinical FTE

### ***Improvement Opportunity Area: Labor***

The health system undertook an initiative to use labor resources more effectively to deliver optimal patient care. Results included:

- Improved staff flexing
- An estimated 2 percentage point reduction in salaries and benefits as a % of net patient service revenue

### ***Improvement Opportunity Area: Clinical Operations***

Texas Children's care teams are proactively making the shift from fee-for-service to value-based care using evidence-based practices and data-driven decision-making. Specifically, these teams are improving quality and cost by reducing variations in care. For example, the health system's initiative for improving asthma care achieved a 49 percent decrease in unnecessary chest X-ray orders, 80 percent utilization of best-practice order sets and 90 percent usage of asthma action plans by providers.

## **Improvement Opportunity Area: Non-labor Improvements**

Texas Children's tackled clinical documentation improvements, including more accurate and timely coding and better billing and revenue capture. The health system also achieved non-labor improvements by standardizing supplies and services and reducing non-labor supply and purchased services costs.

### **14 percent decrease in hospital length of stay while census has increased**

Texas Children's is achieving one of its most important objectives of the DOTV initiative: improving patient access. The health system has sustained a 14 percent decrease in overall hospital length of stay two years in a row. At the same time, the census has increased, enabling physicians to see more patients. The organization's quality improvement initiatives ensure that patients receive quality care as they transition from the hospital to the level of care they need.

### **A data-driven, transparent culture**

The DOTV initiative—supported by data—enables more strategic decision-making and increases the accountability of leaders, providers and frontline managers for their clinical and operating performance. Physicians now have greater accountability for their performance because they are able to understand and track their performance against shared objectives. Accurate, timely, accessible data has made the conversations among medical staff and the administrative team more productive and action-oriented. And when performance issues crop up, leadership can identify them easily and intervene in a timely manner.

*“Through our Delivering on the Vision initiative, we wanted to improve revenue or reduce expense by a net of \$61.4 million. That was our goal, and we gave ourselves 18 months to achieve it. We have far surpassed that target. Health Catalyst's solution has played an integral part in our ability to sustain our gains and deliver even further beyond our goal.”*

– Mark Mullarkey, Senior Vice President

## **WHAT'S NEXT**

Texas Children's will continue to broaden its use of healthcare analytics in support of a growing number of improvement efforts designed to achieve higher-quality care, reduced costs and a better patient experience

# Turning Data from Five Different EHR Vendors into Actionable Insights

When healthcare information systems don't talk to each other, countless inefficiencies and patient safety issues can pile up. To prevent these unwelcome effects and succeed in this value-based environment, Community Health Network (CHNw) embarked on a journey to integrate its healthcare information technologies.

These technologies include four electronic health records (EHRs) within seven acute hospitals, one ambulatory EHR supporting both clinical workflow and billing, and one free-standing ambulatory billing system—from five different EHR vendors—along with additional finance, HR, supply chain systems, patient safety, paid claims and patient experience data sources.

## THE CHALLENGE: INTEGRATING HEALTH DATA ACROSS THE ENTERPRISE

Research shows that the use of more than one EHR from different vendors within a health organization, without the ability to integrate data across all EHRs and other data source systems, threatens patient safety and efficiency.<sup>1</sup> As an organization determined to deliver an exceptional experience to every patient, this was not a risk CHNw was willing to take. To prevent these errors, the health system had to solve several specific issues associated with having multiple, unintegrated data sources:

- Lack of broad view into enterprise-wide data. CHNw had no way to view and analyze clinical and operational performance data across the organization, which complicated internal and external reporting. It was challenging, time consuming, and expensive to develop meaningful internal and external reports, like quality and patient safety regulatory and accreditation reporting. It also hampered efforts to identify and prioritize opportunities

to reduce costs, while improving care and the patient experience.

- Lack of data standardization and governance. With so many different data sources—and data terms and definitions—CHNw was particularly challenged in performing meaningful enterprise analytics, such as evaluating clinical service lines across the health system's different regions.
- Matching patients to care events. For healthcare systems like CHNw that are transitioning to value-based reimbursement and population health management, it is imperative to be able to match patients accurately to their respective care events across multiple sites of care. Given CHNw's data situation, this was a complicated process.<sup>2</sup>

## AN ENTERPRISE DATA WAREHOUSE MERGES SEGMENTED DATA

CHNw took a multifaceted approach to integrating health data across the enterprise, an essential capability to deliver outstanding, value-based care.

Enterprise data warehouse. CHNw selected a Late-Binding™ Data Warehouse (EDW) from Health Catalyst to aggregate and house the health system's multiple sources of clinical, financial, and operational data. This enables the health system to easily mine data for improvement opportunities, while vastly speeding up major data initiatives. Historically, these projects required building a direct interface to each data source—a redundant process no longer needed with an EDW that needs just one interface to pull data in and push data out.

Data governance and standardization. Technology alone doesn't spur a cultural transformation.

Executive sponsorship was also critical for CHNw to make changes in how data was collected, defined, and consumed. CHNw established a data governance committee with broad executive alignment that focuses on data standards, new enterprise reporting needs, education, and communication efforts.

Matching patients to care. To track patient encounters across multiple care locations and information systems, CHNw implemented a patient-to-patient matching solution. By integrating health data with financial and cost data, the health system can now easily correlate patient quality and cost—that is, understand exactly how value is being delivered. This insight is the difference between surviving and thriving in the new value based purchasing environment.

## RESULTS

After implementing an EDW that integrates all key data sources, CHNw now has a comprehensive perspective across the enterprise. The health system can nimbly conduct reporting and engage in quality improvement initiatives, such as pinpointing care variation and measuring adoption of evidence-based guidelines.

- Data from multiple EHR vendors, including four inpatient EHRs and two ambulatory EHRs, plus five transactional systems—HR, patient experience, patient safety, finance, and supply chain—were integrated within 12 months.
- More than 55,000 data elements and over 18 billion rows of data were incorporated.
- Patient-to-patient matching was implemented for over 1.1 million patients across the four inpatient EHRs and paid claims for risk contracts. This is vital for managing patient populations.
- Operational efficiency was improved by 70 percent, with data architects spending an estimated 15 percent of time supporting interfaces compared to an estimated 40-

50 percent before the integration. In one example, CHNw linked its ERP/costing system to the EDW's EHR source marts with just a single validated and governed interface; previously, this would have required building separate interfaces for all six EHRs with little corresponding validation and governance.

*“Even in the most data-rich environment, the ability to perform meaningful analytics and reporting is very limited without strong data governance and standardization. More importantly, patient safety is at risk.”*

– Joe Pollman, Executive Director, Business Knowledge Management

## WHAT'S NEXT?

CHNw continues to strengthen and grow its data governance structure and strategy and eliminate redundant sources of reporting and analytics to optimize its EDW investment. The health system plans to expand integration by incorporating data from specialized systems including multiple claims sources, a Health Information Exchange (HIE), additional CAHP vendors and HR into the EDW. Now, well on the path to advanced data literacy and analytics-driven improvements, CHNw will continue to deploy new tools and applications that make a meaningful impact on every patient.

## REFERENCES

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# Allina Health's Dedication to Quality Improvement Delivers On the Triple Aim



In any industry, improving performance and accountability requires having a shared goal that unites the interests and activities of all stakeholders. For Allina Health—a not-for-profit healthcare system comprised of more than 26,000 employees, 5,000 affiliated and employed physicians, 13 hospitals, 90 clinics, and numerous specialty medical services—that goal is to deliver high value to its patients through all of its services.

To focus its efforts, Allina adopted the definition of value set forth in the Institute for Healthcare Improvement's (IHI) Triple Aim—improving the health of its populations while also improving patient experience and lowering the per capita cost of care.

## **EMBRACING THE MANDATE OF VALUE-BASED HEALTHCARE**

It is widely known that U.S. healthcare is too expensive, too inefficient, and that quality is too varied. Policymakers and industry insiders view value-based healthcare as the solution to this problem—and even as a mandate—for all providers. As Allina's leaders took up this

mandate, they recognized that they would need to realign their strategies, organizational structures, and management practices in order to deliver better value to patients and the community.

Specifically, they recognized that the improvements they sought would require a shift in mindset: They needed to look at healthcare more as a data-driven science rather than a proficiency-based art. They needed to be able to use data-driven insights to deliver such improvements as better outcomes, less variation, fewer readmissions, lower infection rates, and fewer medical errors.

## **A DATA-DRIVEN PERFORMANCE IMPROVEMENT STRATEGY**

As a key component of its mission to achieve the Triple Aim, Allina devised a data-driven performance improvement strategy. The health system implemented an advanced analytics infrastructure based on Health Catalyst's Late-Binding™ Enterprise Data Warehouse (EDW) and Analytics Platform.

Timely, accurate and reliable data helps ensure Allina can deliver the best possible care at a lower cost in pursuit of the Triple Aim while also maintaining a solid bottom line in a mixed-reimbursement-model environment. The analytics platform provides data to clinicians at the point of care, enabling them to focus on the right opportunities and realize outcome improvements.

Allina leaders also instituted a permanent project management structure to identify, oversee, and manage improvement projects. The health system requires each improvement project to

have a business plan with clear improvement and cost reduction goals for a specified period, as well as metrics to ensure visibility into performance.

To systematize improvement further, Allina developed a ten-step quality improvement process model. The data-driven model examines the current state, identifies opportunities for improvement, implements action steps, and measures the results.

Using this ten-step process, Allina teams identified and undertook several important clinical, operational, and financial quality improvement efforts focused on improving productivity, improving the documentation and coding process for more efficient billing, eliminating inappropriate clinical variation, lowering length of stay, and improving care integration.

## **FINANCIAL IMPROVEMENT OF \$125 MILLION IN ONE YEAR**

Allina's systematic efforts to achieve the Triple Aim have yielded the following consistent, impressive results:

### **Advanced the Triple Aim through dozens of improvement projects**

The combination of Allina's analytics platform and project management structure drove improvement projects that achieved a better experience for individuals, better health for populations, and lower per capita costs.

### **Realized a total financial improvement of \$125 million over a one-year period**

The combination of clinical, operational and financial improvement projects yielded significant financial improvements and a strong bottom line in a mixed reimbursement model environment.

The components of this financial improvement include:

- Productivity improvements – \$43 million
- Clinical documentation – \$14 million
- Reducing clinical variation – \$30 million
- Site specific initiatives – \$25 million
- Care integration – \$10 million
- Length of stay (LOS) – \$3 million

The \$30 million financial improvement achieved from reducing clinical variation resulted from a range of improvement projects, including:

- Lowering heart failure readmissions,
- Lowering all preventable readmissions,
- Improving stroke care,
- Improving the prevention and treatment of VTE,
- Improving outcomes for spinal conditions,
- Improving cancer outcomes.

Allina's impressive financial improvements were not just a one-year wonder. The health system has achieved approximately \$100 million a year in financial improvements since the second year of the program—and maintained this for four years.

## **WHAT IS NEXT?**

While Allina and Health Catalyst have now worked together for several years, the two organizations signed a further long-term collaborative agreement in 2015 to improve the quality and lower the cost of care for Allina's patients. Allina will expand the number of clinical and operational improvement projects to continue to improve care and to sustain or grow annual financial improvements of \$100 million per year. The health system will also sustain and reinforce its culture of working on improvements from both a clinical and cost perspective—a dual approach that leads to richer outcomes.

# The Analytics Emergency: Rapid Deployment of Real-Time Analytics, Enabled Incident Command



The COVID-19 pandemic pushed healthcare to rely on data and analytics for decision making and illustrated the criticality of accurate, real-time data and analytics. Despite having ample patient data available for direct patient care, Albany Med's analytics platform had a two-day lag for much of the data. The organization quickly recognized that rapid access to COVID-19 analytics was essential and that it was vital for leaders to have real-time access to data for decision making during the COVID-19 crisis.

## COVID-19 RESPONSE NECESSITATED A CALL FOR REAL-TIME DATA

Before the pandemic, Albany Med had access to volumes of patient data; however, because data had to move from the operational sources to the source databases where they were aggregated into the data platform, the data ingestion process resulted in a two-day delay in visualizing the most current information via the data platform. While this data flow design met most business use cases, it was insufficient for managing the timely response necessitated by the unprecedented COVID-19 spread.

In addition to patient data, workforce data for 13,000 employees, volunteers, and contractors

needed to be made purposeful. That data resided in workforce data across multiple systems, so there was no single source of truth to comprehensively track its workers. Further, there was no direct integration between the employee health system and the human resources system. Albany Med's response to COVID-19 required having specific, requisite data available in real-time to keep the workforce safe and make decisions in the moment.

Albany Med was providing care to thousands of patients seeking testing for COVID-19. Results reporting was complex and time-consuming, requiring staff to receive thousands of faxes from the lab, look up individual patient phone numbers, and attempt to contact and document patient contact. The manual processes for monitoring COVID-19 activity, patient movement, and outcomes were incredibly burdensome. Leaders at Albany Med needed access to data in real-time for decision making during the emerging COVID-19 crisis.

## COVID-19 ANALYTICS AND REAL-TIME DATA IMPROVE PANDEMIC RESPONSE

Upon presentation of Albany Med's first COVID-19 cases, formal incident command was opened. It was immediately apparent that the organization needed to embed analytics into its incident command decision making and daily operations under a new care delivery paradigm. Albany Med leveraged the Health Catalyst® Data Operating System (DOS™) platform and a robust suite of analytics applications to enable real-time access to data and improve the organizational response to the pandemic. The Albany Med data scientists developed robust COVID-19 incident command analytics in two phases.

## Two-phase development of COVID-19 incident command analytics

The first phase of developing the COVID-19 analytics focused on the effective management of patients providing answers to critical questions about patients, such as:

- Who are the patients?
- Where are the patients physically residing in the hospital?
- Do they need testing?
- If tested, are they awaiting a result?
- Do they need care?
- How will care be provided? How will follow-up occur?

The second phase of developing the COVID-19 analytics concentrated efforts on keeping the workforce safe amid continually changing guidelines, shortages of personal protective equipment, siloed systems, and insufficient testing. The primary questions for phase two included:

- Who is working within the organization?
- Which workers are sick?
- Which workers have recovered and can return to work?

## Real-time COVID-19 database

Using DOS, Albany Med used HL7 messaging from various systems to improve the timeliness of data, ensuring the organization could visualize changes as occurring, enabling action. A real-time database to support these needs was built that included:

- Patient information.
- Visit data (encounter type and clinical service, current location, and status changes).
- Orders (all lab order, electronic order indications and details).

- Results (raw lab results, assessment details, and other key-value information).

## Dashboards enable contact tracing and visualization of patient activity

Albany Med quickly developed an epidemiology dashboard, enabling real-time tracking of patients with confirmed COVID-19 cases and persons under investigation (PUI) and centralized results recording. It also created a tool where infection preventionists and clinicians record contact tracing information, exposure tracking, and interventions.

Infection preventionists and clinicians can now quickly and easily visualize all patients who had a pending or positive COVID-19 test from a contact tracing and exposure tracking tool. Albany Med can efficiently visualize patient movement for all PUIs and patients who are known positive for COVID-19 for the last seven days, including movement in and out of the facility, total cases, ventilator utilization, intubation status, and final disposition. These real-time visualizations were actively used for incident command and operations management and are in continuous use now.

## People-matching algorithm for worker contact tracing

To ensure workforce safety, Albany Med joined the different workforce systems into one consolidated list—using person-matching algorithms to match people across the systems—and matched COVID-19 test results with the right worker. Using the same people-matching algorithm, the employee health department replaced its initial paper intake form with an electronic form. The organization can visualize and monitor work locations, mask usage, and symptoms. It can also track which workers have received state-issued quarantine orders.

The organization performs contact tracing for workers and uses decision support to ensure appropriately timed reassessment of symptoms to confirm the need for continued quarantine or the eligibility to return to work. Albany Med can visualize the number of healthcare workers exposed, the number of patients and employees causing the exposures, the incidence of nosocomial infections, and healthcare worker related COVID-19 cases.

### Callback applications

To support the safe restart of elective surgeries, Albany Med developed callback applications and data entry tools for pre-admission testing, tracked antibody testing, N95 fit testing, and availability of necessary personal protective equipment.

The organization stood up a separate contact tracing callback application for first responders arriving for testing and treatment. It also created a report to identify companies that brought in patients with COVID-19 to inform them of the workplace exposure, enabling followup. Albany Med is also aggregating multiple data sources to track COVID-19 positive patients in congregate living facilities, such as nursing homes, treatment facilities, and correctional facilities.

### RESULTS

Albany Med's rapid analytics response enabled the organization to efficiently respond to the COVID-19 pandemic by providing the critical, real-time data required, improving the effectiveness of its incident command.

Results include:

- In less than 16 hours, deployed integrated dashboards for monitoring all COVID-19 activity, including patient testing and activity, care requirements, and supply utilization.
- 99.8 percent relative reduction in processing time, providing incident command the critical data required to drive informed decision making.

- Thousands of patients tested for COVID-19.
- Integrated workforce and COVID-19 data for more than 13,000 employees, volunteers, and contractors.

*"Before the pandemic, we were well aware of some of our limitations, such as a hybrid paper medical record, limited real-time data, and multiple disparate systems within our collective institution. We also knew how powerful data analytics had become for us, helping us understand our current state, challenges, opportunities, and guide decisions. Therefore, there was a special place at the table in incident command for our analytics team, and I believe having them a part of almost every decision and solution was the reason our organization was able to succeed with each challenge the pandemic brought with it."*

– Ashley Telisky, DO, MBA, Associate Medical Director, Albany Medical Center Hospital

### WHAT'S NEXT

Albany Med continues to refine its visualizations and dashboard for optimum interactive application and will pursue opportunities to apply analytics to situations where real-time data can positively impact patient outcomes, increase staff safety, and improve the effectiveness of hospital operations. For example, a real-time visualization for COVID-19, various flu strain PUI, and positive patient tracking is nearly developed, ensuring the organization is ready for what might happen next.



Learn more at [HealthCatalyst.com](https://HealthCatalyst.com)

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