

Improving Population Health for Children with Diabetes



**Texas Children's
Hospital**[®]



HEALTHCARE ORGANIZATION

Children's Hospital

PRODUCTS

- Health Catalyst Analytics Platform built using the Late-Binding™ Data Warehouse architecture
- Key Process Analysis (KPA)
- Pediatric Diabetes Application

EXECUTIVE SUMMARY

Diabetes is one of the most common chronic illness for children living in developed countries. Texas Children's Hospital in Houston is the nation's largest pediatric hospital and ranked as one of the top four Best Children's Hospitals by *U.S. News & World Report*. Hospital leaders wanted to take a more data-driven approach to population health management for patients with diabetes. They started by pursuing outcomes improvements related to diabetic ketoacidosis (DKA) since data from the EDW revealed that 64 percent of diabetes patients discharged had this life-threatening condition and there was measurable variation in costs and care for patients with DKA.

To reduce the variation, they formed a Diabetes Care Process Team (CPT). After the CPT achieved their initial goal of improving care for patients admitted to the hospital with DKA, they set out to implement larger improvements that would benefit the entire population of diabetes patients.

By empowering CPT members, leveraging data to drive decisions, and implementing new interventions effectively, the Diabetes CPT members have improved population health for patients with diabetes across all settings of care. Below are a few of the most significant results.

- [44 percent relative decrease in LOS for patients with DKA.](#)
- [30.9 percent relative reduction in recurrent DKA admissions per fiscal year.](#)
- [34.4 percent relative improvement in the percentage of patients with diabetes who receive the influenza vaccine.](#)

THE CHRONIC ILLNESS THREATENING AMERICA'S NEXT GENERATION

In 2012, 29.1 million Americans, or 9.3 percent of the population had diabetes. What's even more troubling is that more than 200,000 of these Americans are under the age of 20.¹ Diabetes is the most common life-threatening, chronic illness for children living in developed countries.² Texas Children's Hospital is a leader in the research and treatment of children with diabetes. The organization evaluates more than 2,500 cases annually with the goal of helping



We look at our improvement work, and the work of the CPTs, as a miniature laboratory. We have multiple hypothesis and multiple tests. Every improvement aim must have an active PDSA cycle to test the hypothesis. Without that, it is simply a question that is not going to lead to improvement.

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Assistant Professor of Pediatrics
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children, adolescents, and young adults to manage their illness effectively—and live long, healthy, and active lives.

CHILDREN WITH DIABETES: REDUCING VARIATION IN COSTS AND CARE

Leaders at Texas Children's wanted to take a data-driven approach to improving care for diabetes patients. However, they quickly recognized that EHR data alone would not be enough to inform their efforts. To access more clinical, financial, and operational data in real-time, Texas Children's implemented the Health Catalyst Analytics Platform built using the Late-Binding™ Data Warehouse architecture (EDW). With this robust data now at their fingertips, the team used the Key Process Analysis application to determine that there was a measurable degree of unnecessary variability in care and costs associated with these patients, including increased length of stay (LOS) and readmissions.

LEVERAGING TEAMS, TECHNOLOGY, AND DATA TO IMPROVE CARE

Leaders at Texas Children's wanted to take action to improve outcomes for patients with DKA, as well as the broader population of patients with diabetes. The improvement strategy encompassed four key initiatives:

- Establishing the Diabetes CPT.
- Empowering teams to consistently drive improvement.
- Taking a balanced scorecard approach to setting and achieving goals.
- Ensuring adoption of data-driven interventions.

Establishing the Diabetes CPT

Leaders at Texas Children's decided to form a Diabetes CPT. CPTs are typically established for care processes that have a large population of patients, high degree of variation in care, measurable gaps in consistency and quality, and, importantly, organizational readiness to take on improvement efforts. However, forming the team was just the first step. The Diabetes CPT still needed experienced leadership, with a proven track record for using technology and clinical standards to facilitate data-driven process improvements. Dr. Rona Sonabend, Assistant Professor of Pediatrics, Pediatric Endocrinology & Metabolism, and Rhonda Wolfe RN, BSN, MBA, Assistant Director at Texas Children's were the strongest candidates to lead the team.

Dr. Sonabend and Rhonda Wolfe, agreed to co-lead the diabetes CPTs, and understood that their teams would first solve the initial problems identified, and would then need to take on other

Our patients already receive better care than they did five to ten years ago. We also know care will be different and better five to ten years from now. What's most important is that we are no longer waiting for someone else to do this improvement work for us. We are diligent and focused about improving patient care from within the organization.

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challenges, continuing to improve care for patients with diabetes. The DKA improvement was a natural starting place but the teams wanted to ensure that the Diabetes CPT could expand their improvement efforts for the entire population of patients with diabetes, not just those admitted to the hospital for DKA. Understanding that the team desired to continue to grow and improve, the Diabetes CPT began its work—and within 1.5 years, opened a new Diabetic Care Unit for inpatients with DKA. Ultimately, the Diabetes CPT achieved every goal that had been identified—successfully decreasing length of stay, reducing variability, improving hospital throughput, and decreasing the readmission rate, all while improving patient satisfaction. The team's early success in its DKA initiative served as the model for future improvements in care delivery for all diabetes patients.

To continue the forward momentum from the work on DKA, the Diabetes CPT identified core areas of focus to improve the care and outcomes for the diabetic patient population. In turn, this culminated in a comprehensive strategy for improvement, and five new CPTs designed to be co-led by a medical lead and an operational lead (see Figure 1) which report up through the Diabetes CPT.

- [High Risk Care Process Team](#)
- [Education Care Process Team](#)
- [Inpatient Care Process Team](#)
- [Clinic Care Process Team](#)
- [Community Care Process Team](#)

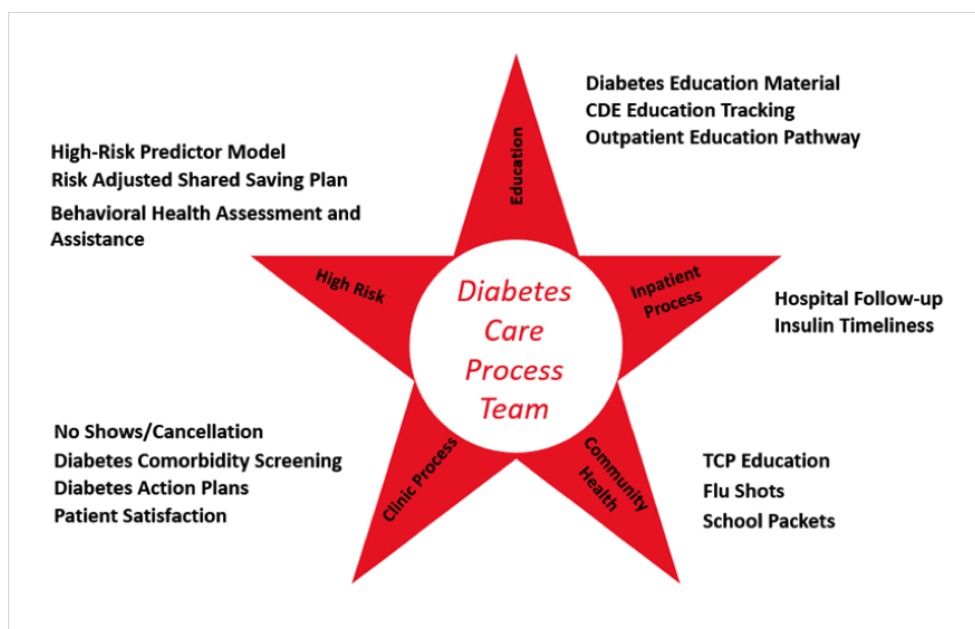


Figure 1. Texas Children's diabetes care process teams and areas of current focus

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The right data shows you what is real and what is true. It allows us to move away from discussing experiences or opinions and just focus on the data. With confidence that the data is accurate, we're able to identify where we need to improve to help patients and take action.

Rona Sonabend, MD
Assistant Professor of Pediatrics
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The new teams were designed to improve population health, reaching the entire population of patients with diabetes, including care providers in all settings. The interdisciplinary teams include everyone involved in patient care from parents and patients to those inside the hospital like physicians, nurses, and ancillary staff, and to those supporting patients outside of the hospital like school nurses and community based providers.

Empowering teams to consistently drive improvement

To be successful, the additional CPTs need to have strong leaders whose professional and personal passions are tightly aligned with the teams' goals. That larger sense of purpose helps physicians and operational leaders to navigate the challenges of achieving and sustaining improvements. CPT leaders receive ongoing, in-depth training and development to ensure that they have the knowledge and skills to effectively implement quality improvement activities. Physicians who are new to quality improvement are also mentored by more experienced physicians.

CPT leaders also contribute to the work of the improvement teams. Rather than just running meetings and delegating assignments, team leads participate in tasks such as data validation, while still fulfilling their clinical and operational responsibilities. There is no hierarchy within the teams. All members contribute their ideas, share their expertise, and have equal representation which keeps them fully engaged and invested in outcomes improvement. Similarly, all team members regularly offer feedback, either appreciating other's contributions or identifying areas for growth.

The five Diabetes CPTs meet independently every two weeks. During these meetings, the teams develop and refine their outcomes goals, generate ideas for Plan-Do-Study-Act (PDSA) cycles, and evaluate the effectiveness of their work. Every six weeks, the co-leads of the Diabetes CPTs meet to present their work, clarify questions, and align on goals. These conversations are critical to finding linkages with other teams and gaining consensus on proposed improvement plans. Team leaders not only celebrate each other's big wins but also provide corrective feedback when necessary. This regular cadence of cross-team meetings fosters relationships and collaboration, helps to prioritize resources, and maximizes team efforts to benefit patients.

Taking a balanced scorecard approach to setting and achieving goals

Texas Children's uses a Modified Delphi process for the development of balanced score cards for each department that are aligned with the Institute of Medicine domains of healthcare quality (see Figure 2).



The Diabetes CPTs are analogous to an incubator base. By coming together, we generate new ideas and learn from one another. It is a real-world playground for innovative improvement ideas.

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DIABETES SCORECARD			
CATEGORY	CLASSIFICATION	METRICS	IOM DOMAINS
GENERAL	OUTCOME	Emergency department visits / hospital admissions for potentially preventable events (established patients)	Effective, Safe
	PROCESS	Percentage of patients treated by providers and ancillary service within timeframes endorsed by national guidelines (includes new and established patients)	Effective, Timely
	OUTCOME	Percentage of children whose community providers have utilized educational tools within EPIC, patient-specific documents within EPIC (e.g., portable medical summary)	Care Coordination
SCREENING	PROCESS	Adherence to screening procedures as defined by national guidelines for the following: cholesterol, blood pressure, thyroid diseases, eye exam, microalbumin, celiac disease and depression	Effective, Efficient
TREATMENT / MANAGEMENT	OUTCOME	Percentage of patients above HbA1c target (7.5) or poor control (>9) (stratify by age)	Effective, Safe
	STRUCTURAL/ PROCESS	Development of a decision tree for strategies to address glycemic control (e.g., referrals for social work - psychology consult - diabetes educator vs. dietician - case management/care coordinator) Utilization of a risk-assessment score to determine the appropriate strategies described on the aforementioned measure	Effective, Efficient, Care Coordination
	STRUCTURAL/ PROCESS	Development of an educational pathway Adherence to educational pathway (all patients will undergo initial training and are re-assessed on condition-specific topics)	Patient-Centered

Figure 2. Diabetes scorecard

Each Diabetes CPT is responsible for establishing measurable improvement goals that align with the balanced scorecard. Each team also has a specific work plan to support those goals and the overall mission. The teams use data from the EDW to evaluate current performance and explore opportunities for improvement. By focusing on the data, and knowing that it's a single source of

truth, the teams are able to focus their discussions on what the data is telling them about their performance. After identifying the improvement opportunities, team members determine their priorities and focus on actionable activities. If a proposed change is necessary but cannot be completed for many months, team members place the item on hold and select something they can move forward on now.

To facilitate data-driven outcomes improvement, each team develops improvement goals that include the specific outcome goal (aim), balance measures, and timeframe for when the goal is expected to be achieved. The teams review national performance benchmarks while establishing goals, allowing them to evaluate how Texas Children’s performance compares to children’s hospitals across the country. Often, the team members discover that the organization’s performance is already higher than the benchmark. However, they also understand that the benchmark performance may not be adequate and frequently set goals that exceed national benchmarks. The CPT has the advantage of having a diabetes specific analytics application which is built on the EDW and capable of integrating information from multiple data sources. By integrating improvement goals into the Pediatric Diabetes Application, teams can quickly visualize and monitor progress towards these goals at every meeting.

Each goal must have an active PDSA improvement plan and defined interventions. The team is dedicated to achieving the desired improvements and heavily focused on activities that will improve patient outcomes. PDSA activities are also tracked in the Pediatric Diabetes Application so that the CPTs can evaluate the effectiveness of their interventions in relation to their goals (see Figure 3). Tracking

FIGURE 3. SAMPLE PDSA INTERVENTION-OUTCOMES TRACKING

- ① Yellow line = trend line by percent
- ② Red = interventions

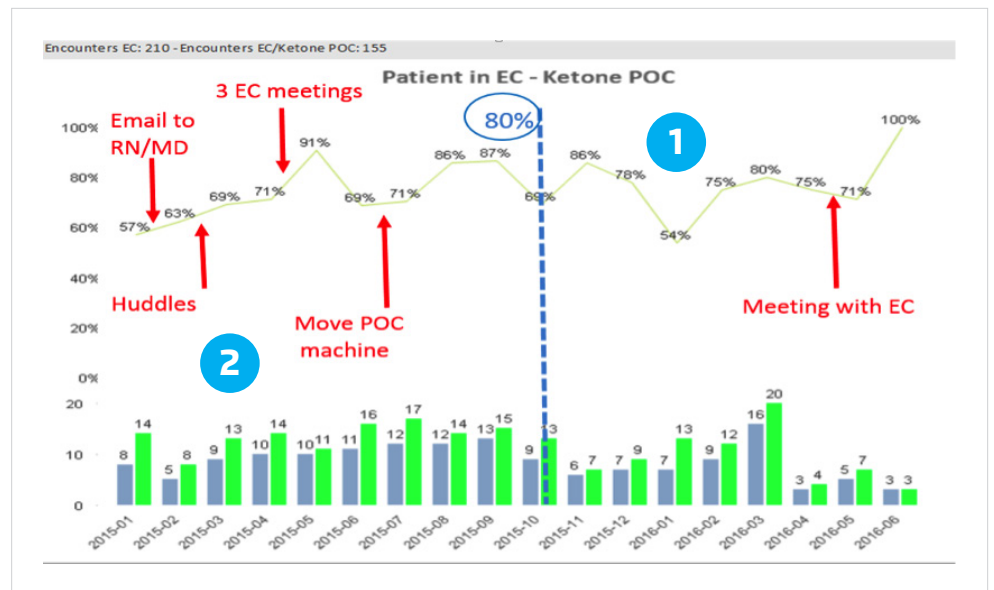


Figure 3. Sample PDSA intervention-outcomes tracking: Patients in emergency center – Ketone point of care

both the outcome goals and the associated PDSA activities in one application helps teams to understand which interventions are effective and should be continued, as well as which interventions are not delivering results so should be discontinued.

Most importantly, team members know that their work doesn't stop once they achieve an outcome goal. They continue to monitor performance in the application to ensure that improvements are sustained. If performance slips, the team investigates why and then develops corrective action plans.

Ensuring adoption of data-driven interventions

Effectively implementing changes and ensuring continued adoption is a pivotal component of successful quality improvement efforts. That's why the CPT members move immediately into implementation once data demonstrates that a proposed intervention is effective and improves patient outcomes. They communicate the planned changes to key stakeholders, along with the data supporting the change and the expectation that teams adopt the changes in a timely manner. This commitment to data-driven action—both to identify and implement improvement opportunities—increases the speed and scale of improvements.

Team members also understand that while everyone wants to improve patient outcomes, change can be difficult. So, it's vital to look for every opportunity to decrease the burden on end users by leveraging technology and automation. They design workflows to reduce, if not all together eliminate, the potential of not following the newly-established processes. Aligning evidenced based standards of care, decision support, automated alerts, and structured order sets with the existing workflow makes it easier for clinicians to do the right thing. As part of the ongoing improvement process, teams monitor the utilization of tools and how each component of the intervention impacts outcomes. If a step in the workflow or a tool does not lead to improvement, they re-evaluate options and may discontinue use of the tool.

RESULTS

Diabetes CPTs have improved population health for patients with diabetes across all settings of care, in multiple locations of care, and has successfully sustained these improvements. Below are a few of the most significant results with links to each of the individual CPT case studies for greater detail.

- ▶ [44 percent relative decrease in LOS for patients with DKA.](#)
- ▶ [30.9 percent relative reduction in recurrent DKA admissions per fiscal year.](#)

- [34.4 percent relative improvement in the percentage of patients with diabetes who receive the influenza vaccine.](#)
- [More than 90 percent of patients receive the annual preventative screening recommended by the American Diabetes Association for thyroid stimulating hormone, lipids, and retinal exams, and more than 80 percent receive recommended microalbumin testing.](#)
- [Implementation of a standard diabetes education curriculum for patients and families.](#)

WHAT'S NEXT

Dr. Sonabend and the Diabetes CPT members are confident that their data-driven quality improvement efforts have positively impacted outcomes for the entire population of diabetes patients. They are equally confident that outcomes will continue to improve because of their effective implementation of interventions and diligent monitoring of metrics on an ongoing basis. Having already achieved such impressive results, Dr. Sonabend and her teams have even bigger goals for the future, aspiring to transform the current model for care delivery and reimbursement system for chronic disease care. They believe that their demonstrated model for quality improvement should be used by others to enhance and improve care, and that these improvements should be financially-incentivized. ♪

REFERENCES

1. American Diabetes Association. (2015). *Statistics about diabetes*. Retrieved from <http://www.diabetes.org/diabetes-basics/statistics/>
2. Kushner, J. (2015). Diabetes 101: Commonly asked questions. *Texas Children's Blog*. Retrieved from <http://www.texaschildrensblog.org/2015/07/diabetes-101-commonly-asked-questions/>

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.

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