TID EXCHANGE QUALITY IMPROVEMENT COLLABORATIVE

IMPROVING CARE FOR HIGH-RISK PATIENTS WITH TYPE 1 DIABETES

CHANGE PACKAGE

JULY 2021

T1D Exchange

TABLE OF CONTENTS

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Acknowledgments: T1D Exchange would like to thank all the faculty members and their dedicated teams for leading this change.

We are grateful for the active participation of patients and families in the Quality Improvement Collaborative. The content of this document reflects a group effort.

This publication and Collaborative are possible by the generous support of The Leona M. and Harry B. Helmsley Charitable Trust.

Graphic design by Judy Higgins, Union Design Inc.

Suggested Citation: Ori Odugbesan, Nicole Rioles et al. T1D Exchange. Improving glycemic management for high-risk T1D patients Change Package. Boston, MA; June 2021.

INTRODUCTION

A change package is a document that describes the improvement methodology for a clinical or operational process.

It includes a collection of ideas and resources that have a high likelihood of resulting in system improvements. The change package is intended to be a pragmatic guide of best practices, testable ideas, tools, and strategies that can be adapted to a new setting, thereby accelerating implementation.

The improving glycemic management for high-risk patients change package represents shared learning from 10 clinical sites participating in the T1D Exchange Quality Improvement Collaborative (2018-2020). The T1D Exchange QI Collaborative model is an adaptation of the Institute for Healthcare Improvement's (IHI) Breakthrough Series Model. (1)

The T1D Exchange QI team, faculty, and clinical team members developed this change package. It includes test ideas employed by the different participating sites and is shaped by their experiences. These change ideas can be tested quickly using the IHI Model of Improvement.[1] The change package aims to give a robust framework for successfully implementing the interventions described to improve glycemic management in high-risk patients in various clinical practice environments.

HOW TO USE THIS CHANGE PACKAGE

This document should be used by teams who are seeking ideas for testable changes or ideas in their improvement efforts. It is best used in combination with other tools, including skills and experience with quality improvement methodology[2]

Clinical sites should consider the following to determine readiness to implement a change package:

- Strategic alignment with institutional goals
- Identification of a champion and motivated team
- The consensus around the relevance of project aims and desire to implement change
- Development of a specific, measurable, achievable, realistic, time-bound (SMART) aim
- Personnel with skills to map existing clinical processes, identify potential failures and opportunities
- Organizational willingness to try small tests of change (PDSA cycles); adapt what works and abandon what does not
- Personnel with analytic capabilities to measure and display data over time for learning
- Infrastructure to spread successful interventions to eligible clinic population and sustain over time
- Partnership with patients and families to increase patient engagement and readiness

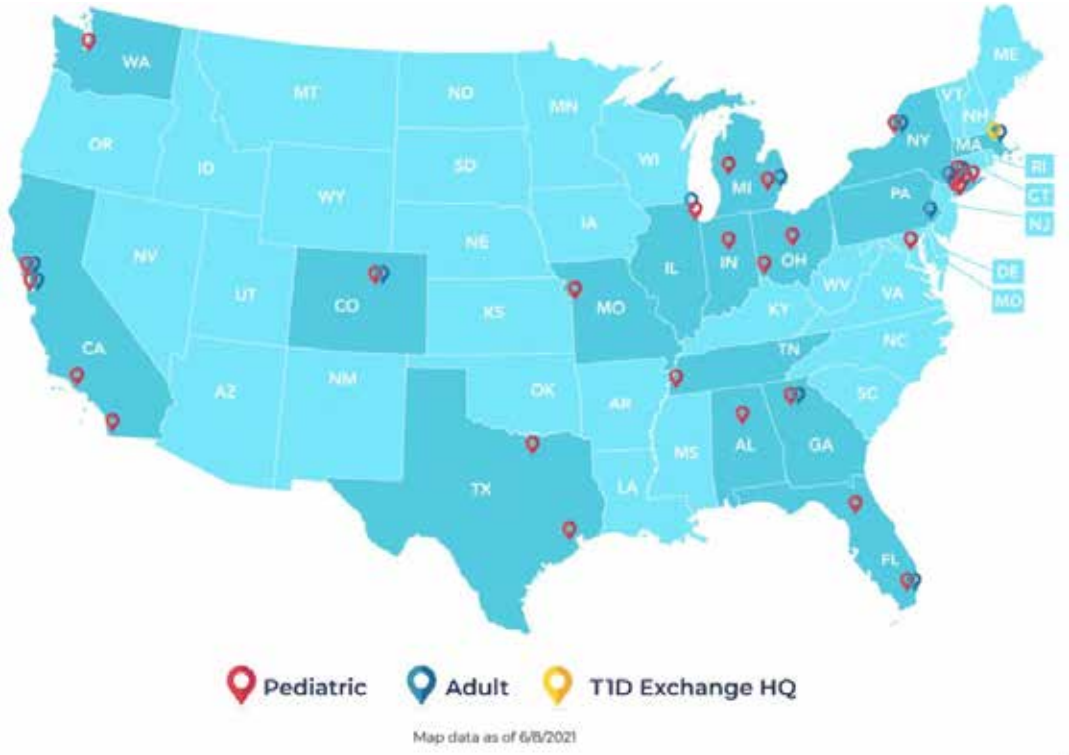
BACKGROUND

The T1D Exchange is a Boston-based nonprofit with the mission to improve the outcomes of people with type 1 diabetes (T1D) through facilitating better care and accelerating new therapies. The Exchange was created in 2009 and has generated extensive capability to accelerate research, drug, and device development, including a network of adult and pediatric practices, and a data coordinating center in Boston.

The T1D Exchange facilitated a Quality Improvement Collaborative starting with ten clinical sites to increase the capacity of quality improvement (QI) in their T1D practice sites. The Collaborative has expanded to 40 clinical sites and growing (Figure 1) see clinic site profiles in Appendix A).

In designing T1DX-QI, the T1D Exchange engaged endocrinologists, patients/families living with T1D, information technology experts, diabetes educators, and QI experts, amongst others, to design broad "interventions" that can result in the highest impact for patients and lead to improved organizational quality improvement culture[3]. Participating organizations received QI training from T1D Exchange staff and Institute for Healthcare Improvement (IHI) faculty.

FIGURE 1 **GEOGRAPHICAL DISTRIBUTION OF 40 QIC SITES AS OF JUNE 2021**



HIGH-RISK T1D DESIGNATION

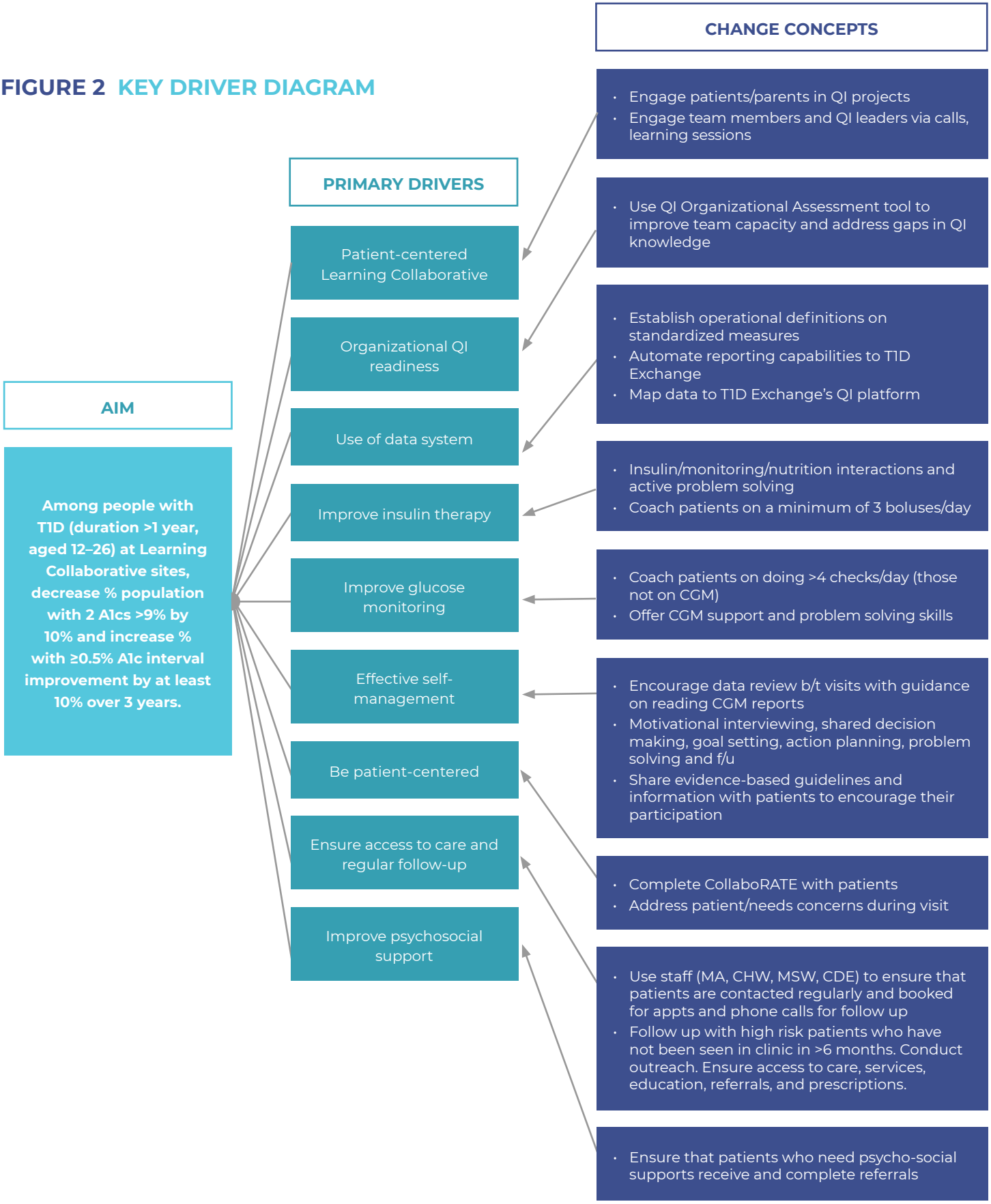
At HbA1c values above 9%, patients with T1D have an increased risk of diabetic ketoacidosis and other long-term adverse effects from poor glycemic control. In a study by Karamat et al., an initial HbA1c interquartile range (IQR) of 8.0 to 9.3% was lowered by a QI intervention to 7.9 to 8.9%, indicating that QI interventions can remove people from the high-risk category into better glycemic management[4]. The study at Baylor University lowered the IQR of patients' HbA1c from 8.5 to 14% to 7.4 to 11%[5]. Reduction in HbA1c helps reduce the risk of diabetic ketoacidosis (DKA), making it a common goal of QI interventions and improving the lives of T1D patients in the process[6].

The T1DX-QI aim focused on high-risk patients, ages 12-26, with an HbA1c>9%. As interventions evolved and as clinics systematized the tests of change, most clinics set goals to expand interventions to eventually reach and benefit all patient populations. The initial value of starting with a small, focused cohort fit the QI methodology and let clinics take more chances while limiting their risks. As improvements were confirmed and operationalized, the cohort focus expanded to impact and benefit T1D patients of all ages and all HbA1c levels.

Interventions varied across clinics as well as the successes and impact reported. Overall, we find that QI interventions for T1D are beneficial for improved glycemic management and outcomes. Reducing HbA1c across a broad, high-risk population is challenging and requires technical, systematic, and continuous practice changes to support patients.

KEY DRIVER DIAGRAM

FIGURE 2 KEY DRIVER DIAGRAM



A Key Driver Diagram (KDD) is a theoretical model for improving the process (Figure 2).

The figure's left side includes a SMART (specific, measurable, achievable, realistic, time-bound) aim. The aim should be a precise statement of what the team hopes to achieve as determined by measurable changes that can be accomplished in a given time frame with available resources (people, time, support). The center column lists key drivers that are essential components for the aim to be accomplished. For improving glycemic management, the following primary drivers were identified:

1. Patient-centered learning collaborative
2. Organizational QI readiness
3. Use of data system
4. Improve insulin management
5. Improve glucose monitoring
6. Effective self-management
7. Patient-centered care
8. Ensure access to care and regular follow up
9. Improve psychosocial support

Lastly, the right-hand column lists potential interventions or testable ideas related to each of the drivers.

Interventions to improve glycemic management in patients living with T1D can be reliably implemented with clinically significant results. Teams adapted implementation of elements reflected in key drivers to meet the resources of the clinical care environment in which the team operates. The following tables outline change concepts, testable ideas, and interventions tested at different clinical sites. The interventions below were tested around five primary drivers: insulin management, glucose monitoring, access to care, psychological screening, and patient-centered care.

PRIMARY DRIVER 1: IMPROVE INSULIN THERAPY

J. Test ideas to improve participation in an evidence-based curriculum to educate patients on giving at least 3 short acting boluses daily

K. Complete and check for patient/parent understanding on a sick day plan

L. Identify barriers and share tools to support the changes to increase insulin pump/pod adoption for high-risk patients

PRIMARY DRIVER 1: IMPROVE INSULIN THERAPY

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
A1 Test different apps or books that lead to better dose calculations for patients and higher patient satisfaction.	**A1.1** Mobile Applications include Insulin Calculator, Advanced Insulin Advisor, Diabetes: M, insulin pen, Bluetooth technology, etc., Tidepool mobile **A1.2** Diabetes Advanced Network Access (DANA) App **A1.3** Adjusting Insulin Dosage-BDC Center **A1.4** "How Can I Manage My Type 1 Diabetes Better?" –USC Center for Diabetes **A1.5** "How Can I Manage My Type 1 Diabetes Better?" (SPANISH Version) **A1.6** Tidepool Mobile	Barbara Davis Center (BDC) Texas Children's

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PRIMARY DRIVER 1: IMPROVE INSULIN THERAPY

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
B1 Ensure all patients/ families are coached on sick day protocols	**B1.1** T1DX sick day one-pager (English) and sick day one-pager (Spanish) **B1.2** U-M Pediatric Diabetes Sick Day Page **B1.3** Sick Day Action Plan from BDC **B1.4** Sick Day Action Plan Instructions from BDC **B1.5** BDC Sick Day Quiz	Texas Children's BDC
C1 Use an educational tool to explain the pros/cons of pumps/pods so that patients can make an informed choice.	**C1.1** Tim Wysocki Educational tools for Insulin Pump **C1.2** "Is the Insulin Pump Right for Me?"-USC Center for Diabetes **C1.3** "Is the Insulin Pump Right for Me?" (SPANISH Version) **C.1.4** Diabetes Wise	University of Michigan (Michigan)

PRIMARY DRIVER 2: GLUCOSE MONITORING

A. Assess Patient and Family barriers to blood glucose monitoring
B. Focus on patient "drivers" goals, quality of life, motivation
C. Spend time with patients to understand meaningful metrics beyond HbA1c
D. Develop a Care Atlas that provides support beyond the clinic (i.e., connecting patients with peer-to-peer support)
E. Ensure families have appropriate data literacy skills
F. Encourage CGM adoption as appropriate
G. Access to the team between visits; Telehealth/calls/text/home visit/MyChart
H. Facilitate Access to Tools (CGM) (System/clinic)
I. Advocacy with payers

PRIMARY DRIVER 2: GLUCOSE MONITORING

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
A1 Use an appropriate assessment tool to discover barriers **A2** Match patient-reported barriers to tools	**A1.1** U-Michigan Barriers Assessment Questionnaire **A1.2** U-Michigan Blood Sugar Checking Toolbox Blood glucose monitoring methods comparison	Michigan Children Mercy Hospital (CMH)
B1 Identify what is going well, use neutral language, focus on behavior/ remove judgment. Use Diabetes Conversation Cards to guide a discussion. Use motivational interviewing techniques.	**B1.1** Diabetes Conversation Cards	Michigan
C1 Test patients' ability to understand their AGP report and see if that leads to an increase in time in range.	**C1.1** AGP Guide	Texas Children's

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PRIMARY DRIVER 2: GLUCOSE MONITORING

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
D1 Make a care atlas available to the whole diabetes team so calls can be triaged to community resources. Refer patients to "peer to peer" groups.	**D1.1** Local JDRF Chapters	Cincinnati Children's (CCHMC)
E1 Viewing and acting on data. Spend time during the visit reviewing BG data with families to understand goals, trends, and how the trends indicate a possible change to bolus and/or basal patterns **E2** Test out a variety of tools that can help with data literacy **E3** Test out "teach-back" methods to ensure the patient is understanding key themes **E4** Test and track changes at visits to measure changes and progress made. Share back with family to keep them engaged and feeling positive about their learning.	**E1.1** Diabetes Numeracy Test (short version) from Vanderbilt **E1.2** ENDO2018 Adjusting CGM Trend Arrows **E1.3** Pediatric worksheet CGM Dexcom G5 **E1.4** Pediatric worksheet from Dan DeSalvo **E1.5** Adult worksheet CGM Dexcom G5 **E1.6** CGM Pocketcard	Texas Children's Nationwide Children's (NCH)
E5 Test patients/families on competency and confidence in self-management during new-onset training	**E5** Confidence and Competence Curriculum & Quizzes	CMH

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PRIMARY DRIVER 2: GLUCOSE MONITORING

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
F1 Test out appropriate times for onboarding newly diagnosed patients and educating them on CGM use	**F1.1** Tim Wysocki Educational tools for CGM	Texas Children's
F2 Use conversation cards to explain the pros/cons of CGM use	**F2.1** Blood Sugar Monitoring Conversation Cards	Michigan
F3 Re-offer CGMs to patients periodically as appropriate	**F.3** Diabetes Wise	
G1 Test different methods of providing touchpoints between visits. Note patient preferences.	**H1.1** CoYoT1 Clinic: Innovative Telemedicine Care Model for Young Adults with Type 1 Diabetes	CMH
H1 Automate Certification of Medical Necessity Letters in Epic to fill patient requests	**H1.1** Medicare CMN form for Dexcom	Texas
	H1.2 Commercial insurance CMN form for Dexcom	
	H1.3 Letter of Medical Necessity Medtronic	
	H1.4 Coverage for Abbott's Libre	
	H1.5 Medtronic 670 Appeal Letter template when pump is approved but CGM is not	NCH
	H1.6 CGM appeal letter template (Nationwide)	
	H1.7 CGM CMN letter (Texas)	Texas Children's
I1 Get involved with advocacy to ensure your state's Medicaid covers CGMs	**I1.1** ADA Advocacy Priorities	Texas Children's Children's Mercy

PRIMARY DRIVER 3: PATIENT-CENTERED CARE

J. Use innovative strategies to improve patient knowledge on carb counting, fat and protein gram estimation, medication, technology, sick day management

K. Adopt a self-management action plan to document and monitor goals, motivations, and QOL priorities for high-risk patients

L. Use patients, parents, and community members to connect and provide peer support

M. Screen all high-risk patients for social needs at least yearly and refer as appropriate.

N. Stratify patients by race, other social determinants of health to identify disparities in high-risk patients (to improve understanding and awareness of program-specific inequality)

O. Host focus groups among vulnerable, high-risk groups to identify and seek recommendations to address social determinants (for example language, health literacy, transportation, etc.)

P. Implement and improve T1D Exchange Patient-Reported Outcome Measures for all high-risk patients.

Q. Use phone follow-up, texting, and emails to increase communications between clinic visits.

PRIMARY DRIVER 3: PATIENT-CENTERED CARE

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
A1 Use teach-back methods to ensure the uptake of this knowledge by the patient/family.	**A1.1** A1.1 Lilly Carbohydrate Guide **A1.2** Novo Nordisk Carbohydrate & Meal Planning **A1.3** Self-Assessment Quizzes on various diabetes topics (UCSF) **A1.4** Tidepool Mobile **A1.5** BDC Sick Day Quiz	BDC NCH

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PRIMARY DRIVER 3: PATIENT-CENTERED CARE

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
B1 Use goal-setting formats for high-risk patients and find ways to set achievable goals **B2** Track and monitor patients' goals and progress **B3** Use conversation cards to understand patient concerns, needs, and motivations **B4** Document goal(s) in flowsheet or EMR template that is structured. **B5** Review goals at future visits to understand the progress and to identify whether goals have shifted or reprioritized.	**B1.1** Setting SMART goals **B1.1.2** Texas' CDE assessment w/ goals & more (long version) **B1.1.3** Texas' CDE assessment w/ goals & more (short version) **B1 1.4** Example of Patient Tracking Spreadsheet **B1 1.5** Flip the Clinic Conversation Cards	Texas Children's Michigan
C1 Screen for social determinants of health	**C1.1** Health-Leads Screening Tool **C1.2** AAP Food Insecurity screening tool	CCHMC
D1 Test the implementation of a PRO in your clinic flow that documents and addresses patient needs	**D1.1** Patient Needs Adult Survey **D1.2** Patient Needs Pediatric Survey **D1.3** Diabetes Distress Scale **D1.4** PedsQL **D1.5** DAWN Study QoL Survey **D1.6** CollaboRATE	CCHMC

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PRIMARY DRIVER 3: PATIENT-CENTERED CARE

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
H1E1 Test out appropriate touchpoints and frequency of touchpoints between clinic visits **H1E2** Use apps to manage and support diabetes	**E1.1** CoYoT1 Clinic: Innovative Telemedicine Care Model for Young Adults with Type 1 Diabetes **H2** Diabetes emoticons The University of Michigan Diabetesemoji Stickers The University of Michigan deapp Diabetes Education App- UK based BD Briight diabetes assistant-nutritional device, digital diabetes assistant CalorieKing food database, including chain restaurants Figwee visualization tool for portion sizes Fooducate nutrition tracking tool, nutrition grade for foods, personalization, community support Glucagon step by step instructions (my parents have this on their phone) My Fitness Pal exercise and nutrition tracker mySugr tracking tool for blood glucose Onedrop tracking tool for blood glucose, reminders Tidepool tracking tool Glooko tracking tool	CMH BDC

PRIMARY DRIVER 4: ACCESS TO CLINICAL CARE

A. Review the list of patients reviewed for Diabetic Ketoacidosis (DKA) monthly to identify contributing factors/patterns and test possible improvement tests to address avoidable causes

B. Identify staff to follow up and offer appointments to patients admitted or seen in the emergency room for a diabetes-related event at least within five days from event notification

C. Improve event notification for ER visits and hospitalizations and implement a plan to have staff ensure these patients have appropriate follow-up care scheduled

D. Test and implement effective methods to engage high-risk patients who have not been seen in more than 90 days

E. Improve third next available follow up appointments for high-risk patients

F. Enroll eligible high-risk patients in the electronic patient portal

G. Implement/improve the program to transition pediatric patients to adult care

PRIMARY DRIVER 4: ACCESS TO CLINICAL CARE

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
A1 Test out methods for reviewing DKA cases to track contributing factors **A2** Test out readmission tools to assess patients' risk for readmissions **A3** Test out approaches to reduce readmissions	**A1.1** Readmission Case Review and Analysis Tool **A1.2** Follow-up survey after diabetes-related hospitalization (Nationwide) **A2.1** Use risk of Readmission Assessment Tool **A3.1** Reduce Medicaid Readmissions AHRQ Tools **A3.2** Texas' Social worker assessment for recurrent DKA with solutions	Texas Children's NCH
B1 Create a clinic flow for communicating back to patients who were seen in ER/hospitalized	**B1.1** Mapping and Redesigning Workflow How-to **B1.2** Sample action plan for systematic response to ED/urgent care visits (CCHMC example)	CCHMC

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PRIMARY DRIVER 4: ACCESS TO CLINICAL CARE

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
C1 Track scheduled follow up appointments to ensure follow-up is being completed	**C1.1** CCHMC's QI Project to ensure patients have their next appt scheduled	CCHMC
D1 Test out strategies for engaging patients who may otherwise be lost to follow-up	**D1.1** AHRQ Patient & Family Engagement tool-kit **D1.2** Michigan Follow-up Protocol	Michigan BDC
E1 Share and test approaches to improve third next available follow up appointments for high-risk patients		NCH BDC
G1 G1 Test out different curriculums to prepare teens for adult care **G G2** Partner with a clinic to support the transition between the two. How can a warm handoff be done?		CCHMC

PRIMARY DRIVER 5: PSYCHOSOCIAL CARE

A. Ensure all high-risk patients are screened at least annually for depression

B. Educate and manage/refer high-risk patients to psychosocial resources and community support services

C. Evaluate high-risk patients for social adjustments/diabetes distress after major events or at least annually

D. Integrate Clinical PROs into practice

PRIMARY DRIVER 5: PSYCHOSOCIAL CARE

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
A1A1 Test ways to administer the screen (i.e. via iPad) to ensure high rates of screening **A A2** Send a letter to patients/family to explain the importance of depression screening **A.3** Use SOP, Scripts, and handouts to support, providers, staff, and patients.	**A1.1** PHQ2/PHQ9 **A.3.1** 1Diabetes, Depression, and Burnout Diabetes, Depression, and Burnout (Spanish) PHQ Scripts for teams	CMH Texas Children's
B1B1 Test a protocol for referring patients to community services **B2B2** Track rates of referrals and rates of referrals completed **B3B3** Ask patients if the referrals helped. How? Why?	**B1.1** ADA Mental Health Provider Directory Listing	CCHMC

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PRIMARY DRIVER 5: PSYCHOSOCIAL CARE

INTERVENTIONS	TOOLS/RESOURCES	WHO TESTED THESE?
D1 Test different ways to ask patients about their needs/concerns that might be otherwise missed	**D1.1** Patient Needs Adult Survey (Appendix B) **D1.2** Patient Needs Pediatric Survey (Appendix B)	Texas Stanford Children's Penn Medicine
D2 Work with patients on goal setting	**D1.3** DAWN Dialogue Tools	
D3 Document PRO in a reportable way so that it can be measured over time		

SITE RESULTS

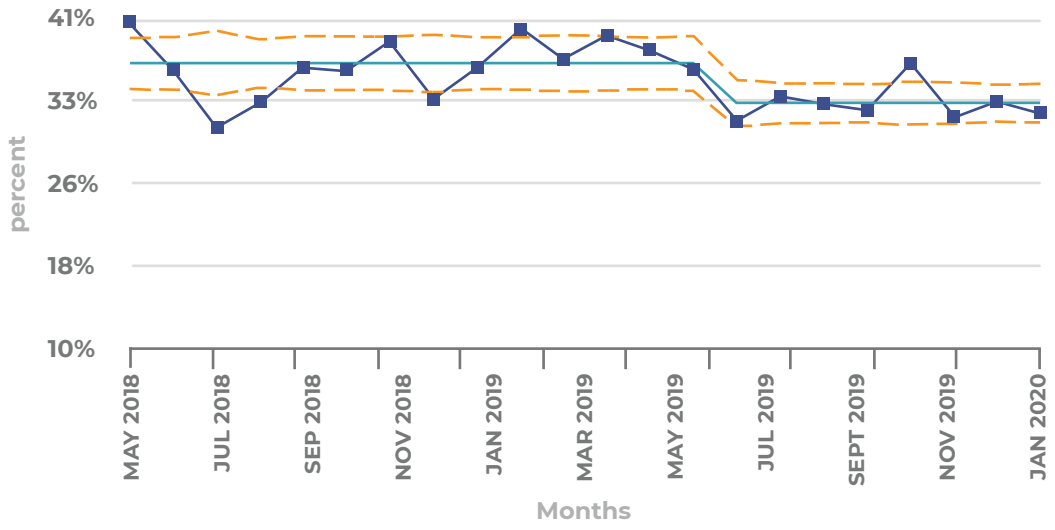
The results below are from ten sites that participated in monthly calls, learning sessions, and completed numerous rapid improvement cycles (Plan-Do-Study-Act cycles) May 2018 – June 2020. The sites are listed below.

- Cincinnati Children's Hospital Medical Center, University of Cincinnati, OH
- C.S. Mott Children's Hospital Pediatric Diabetes Clinic, Michigan Medicine, Ann Arbor, MI
- Nationwide Children's Hospital, Ohio State University, Columbus, OH
- Barbara Davis Center for Diabetes, University of Colorado, Aurora, CO
- Texas Children Hospital, Baylor College of Medicine, Houston, TX
- Children's Mercy - Kansas City, University of Missouri - Kansas City, Kansas City, MO
- Lucile Packard Children's Hospital, Stanford University, Palo Alto, CA
- SUNY (State University of New York) Upstate, Joslin Center, NY (Adult)
- University of Pennsylvania PA (Adult)
-

CHILDREN'S MERCY HOSPITAL HIGH-RISK PROGRAM

The Medical Assistant (MA), Community Health Worker (CHW), Social Worker (SW), and Certified Diabetic Educators (CDE) contact patients to ensure that patients are scheduled for appts and called for follow-up. The team followed up with high-risk patients who have not been seen in the clinic for more than 6 months. The team started weekly or bi-weekly direct-to-consumer telehealth visits offered to high-risk patients to increase face-to-face access to the diabetes care team. In October 2018, the diabetes team at Children's Mercy utilized the Kid Care Anywhere mobile application ("app") to provide a secure video conferencing platform for these visits. The series of calls (every week or every other week) are scheduled between standard of care (SOC) visits and typically last approximately 15 minutes. Interventionists (CDEs, RNs, RDs, Physicians) were trained on using the app and were equipped with an intervention manual that included scheduling procedures, and telehealth discussion topics. The team worked closely with high-risk patients and encouraged data review between visits, they provided guidance on reading CGM reports, and shared evidence-based guidelines and information with patients to encourage their participation; they completed CollaboRATE with patients and addressed patients' needs and concerns during visits, piloted a weekly peer mentoring program (Patients Encouraging and Engaging Peers, PEEPS) designed to give 6 months of ongoing support and encouragement to teens with T1D. This was done by matching them with a mentor who also has T1D and is 18-26 years old. The peer mentors completed comprehensive training provided by social workers and communicate with the teens enrolled via phone or video chat application on a weekly or every other week basis. Figure 3 below shows a favorable decrease in high-risk patients of 4% from baseline. The baseline before intervention was 37%, and this decreased to 33% following 22 months of testing interventions outlined above.

FIGURE 3 CMH HIGH RISK

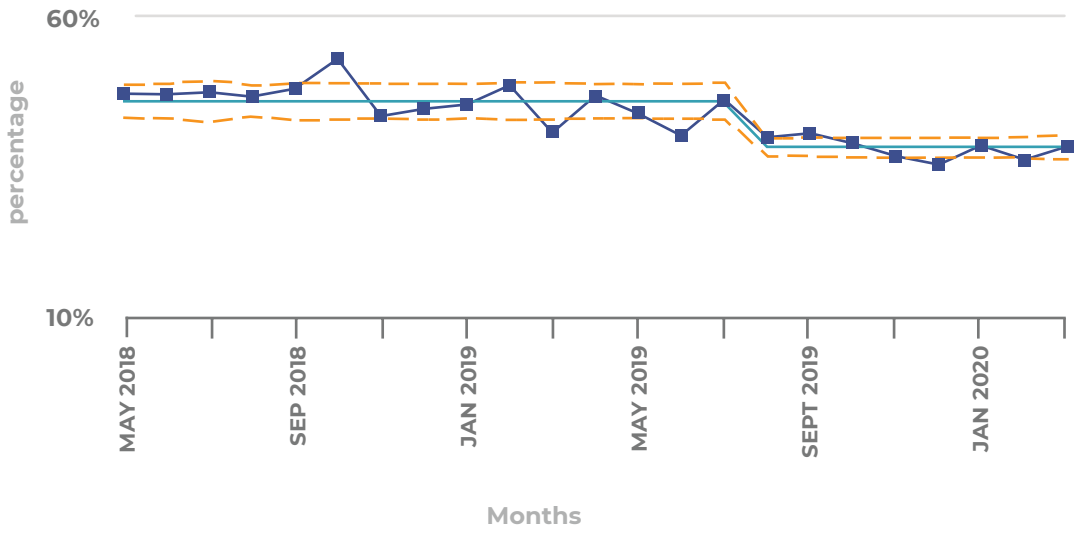


BARBARA DAVIS CENTER HIGH-RISK PROGRAM

The Barbara Davis Center has utilized the addition of a High-Risk Patient Navigator (PN) to assist in providing extra care to their high-risk patient population. The PN's role includes reaching out to patients to individually schedule appointments and establish continuity with a provider; address any barriers to attending appointments and help troubleshoot these barriers and provide pre-visit planning to make sure the patient gets exactly what they need out of their visit. BDC's high-risk patient population consists of 502 (14%) identified patients. Criteria used to define this population include HbA1c of 9 or greater, repetitive no-shows or late cancellations; multiple DKA/severe hypoglycemic hospitalizations; social work involvement (SCAN); substance abuse; or insurance coverage issues.

The PN started in March of 2019, and since then she has made over 1,000 scheduling calls, with 45% of these scheduled at the time of the call. On average, 75% have a future follow-up appointment scheduled at any given time (a 25% increase). The center has collected 333 pre-visit planning questionnaires and has identified top patient barriers as 1) Education/resources; 2) Diabetes Burnout; and 3) CGM/Supplies related. The patient navigator has been successful in its role of providing more value to diabetes visits, encouraging patients and families to attend more routinely, and keep patients and families of high-risk children stay connected to their clinic. Figure 4 below shows a 7.6% decrease in the number of high-risk patients at the Barbara Davis Center.

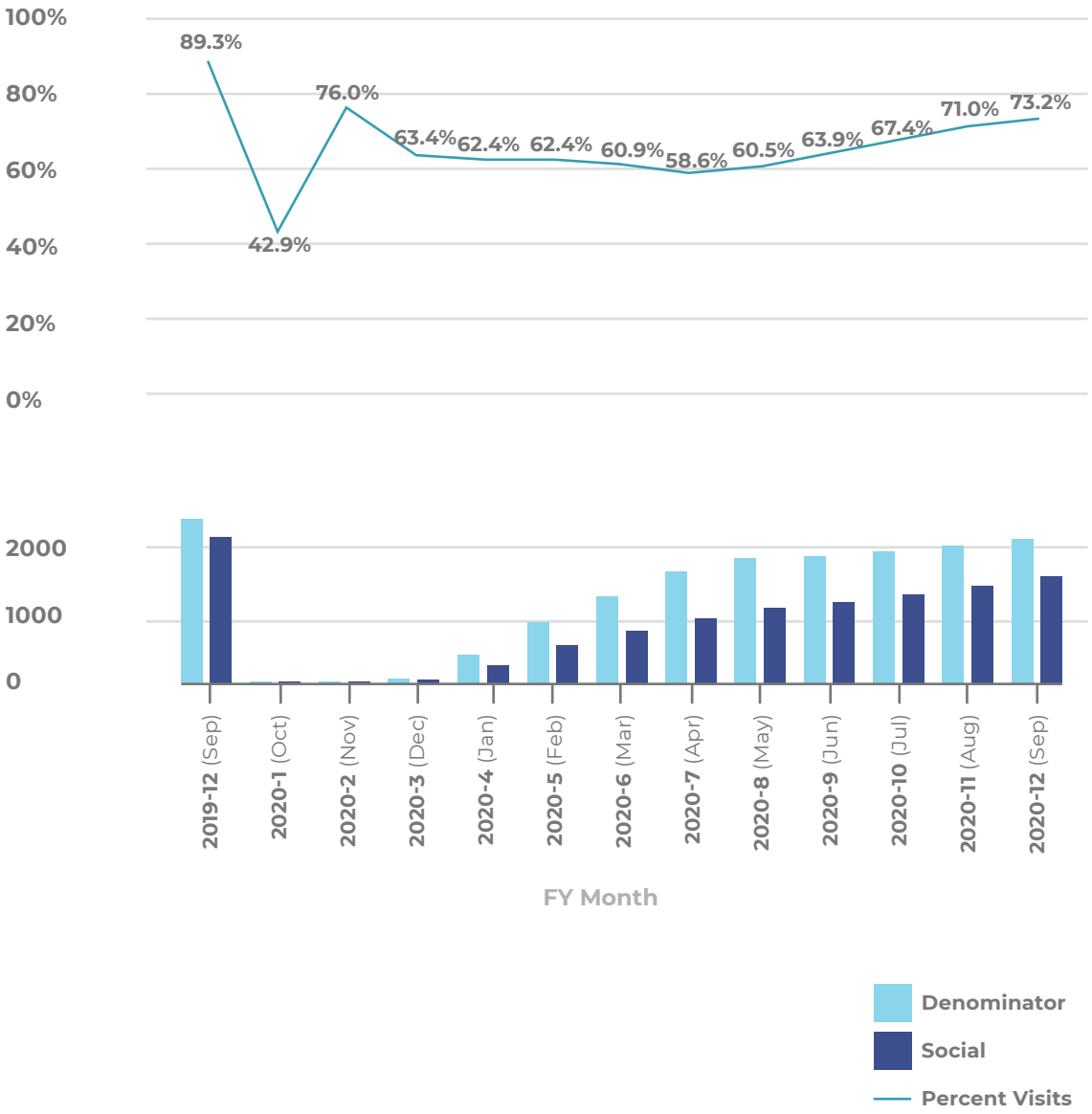
FIGURE 4 BDC PEDS HIGH RISK PATIENTS



TEXAS CHILDREN HIGH-RISK PROGRAM

Texas Children's has implemented several strategies to try to reduce HbA1c, DKA admissions, and other adverse sequelae for children and adolescents with T1D. This includes having a "High-Risk" social worker who as part of her routine social work role, also focuses her efforts on children in the "Extra-Care Cohort". This Cohort is a running cohort of patients who come into the hospital with multiple DKA events. She follows up with patients with phone calls and assesses and addresses barriers they may face. The team has also worked on improving yearly social work visits, as well as expanding access to psychology care. The psychologists on the team have worked on increasing their visibility by increasing inpatient consults for DKA patients, meeting patients who are admitted for new-onset diabetes, and before COVID 19 restrictions, also worked on meet and greets with some patients as they came for routine diabetes clinic visits. The team realized that a major barrier to continuous glucose monitor use in some patient populations was the fact that public insurers would not cover the costs of CGM. As such, a large advocacy effort was undertaken, which recently culminated in public insurers now paying for CGM use in publicly insured patients. The team also amended the existing social work assessment and made it more targeted for children with diabetes. The Diabetes Assessment tool was developed and can be used by all social workers who interface with children and adolescents with diabetes. The assessment asks questions about strengths and weaknesses that the patient and their family perceive as it relates to T1D care. It also delves into many of the barriers that impact diabetes care, such as limited supervision, family conflict, burnout among others. They tried interventions based on barriers identified. This assessment has been in use for children who come in with DKA for several months. The team is working on expanding its use in all clinical encounters that social workers have with patients. The social workers are in the process of identifying the top 3 barriers and the top 3 interventions that have helped. The team also developed a DKA risk score. This score considers variables such as HbA1c, payer type and gives a score that assesses a child's risk of DKA episodes. The score is live in the EMR, and the team is working to put specific interventions in place based on the DKA risk score. Children who fall in the high-risk category will be screened using the Diabetes Assessment and interventions will be individualized based on the result. The chart in Figure 5 shows a progressive increase in the number of social work ancillary visits.

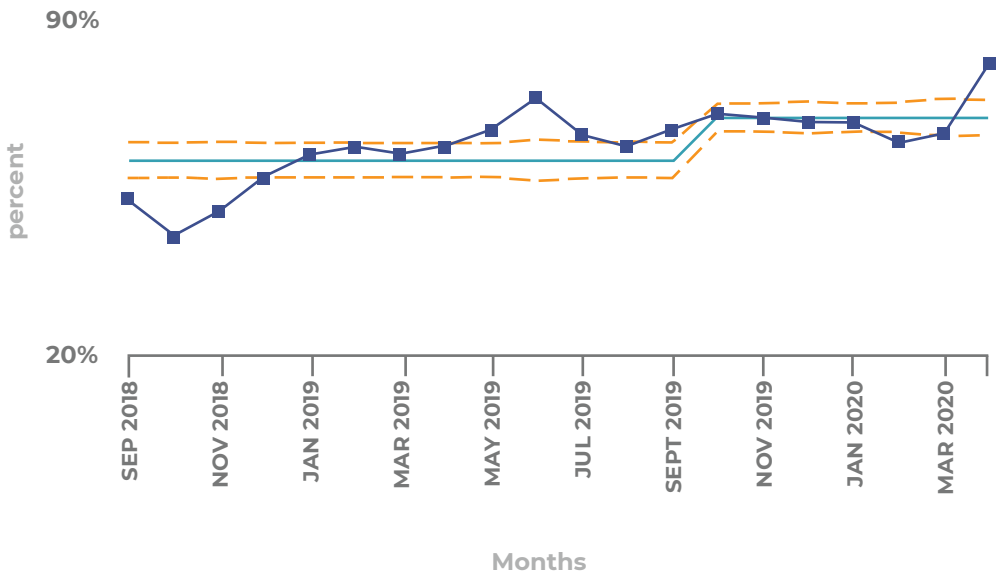
FIGURE 5 NUMBER OF PATIENTS WITH EVIDENCE OF SOCIAL WORK ANCILLARY VISITS IN THE FY



UNIVERSITY OF MICHIGAN INSULIN PUMP QI PROJECT

The University of Michigan implemented new processes for insulin monitoring, nutrition interactions & active problem solving and coached patients on a minimum of 3 boluses/day. They tested the following interventions: Used an educational tool to explain the pros/cons of pumps/pods so that patients can make an informed choice. Created a comprehensive handout that lays out available pump options to assist with informed decision-making. The team created an insulin delivery barriers assessment questionnaire, determined barriers to bolusing, and tailored recommendations to the barriers identified. Providers, CDEs, SWs, and psychology used the tool with patients who were struggling with insulin administration. The tool helped facilitate a patient-centered conversation and goal setting. The integrated fields to the diabetes visit EHR flowsheet helped to track identified barriers and goals. The team implemented an evidence-based protocol on insulin adjustment between visits and taught patients/families how to interpret diabetes data and recognize patterns, understand insulin dosing and how behaviors can affect blood sugar, and how to adjust insulin doses. They also tested different mobile applications and books that lead to better dose calculations and higher patient satisfaction. To ensure that patients had access to affordable insulin, the team linked resources to their website (ABC Diabetics, NDVLC, ADCES) and ensured that social workers helped patients with coverage issues on an individual basis. Figure 6 below shows an increase in insulin pump use of 8% from baseline. The baseline before intervention was 61%, and this increased to 69% following 17 months of testing interventions outlined above.

FIGURE 6 MICHIGAN PUMP USE



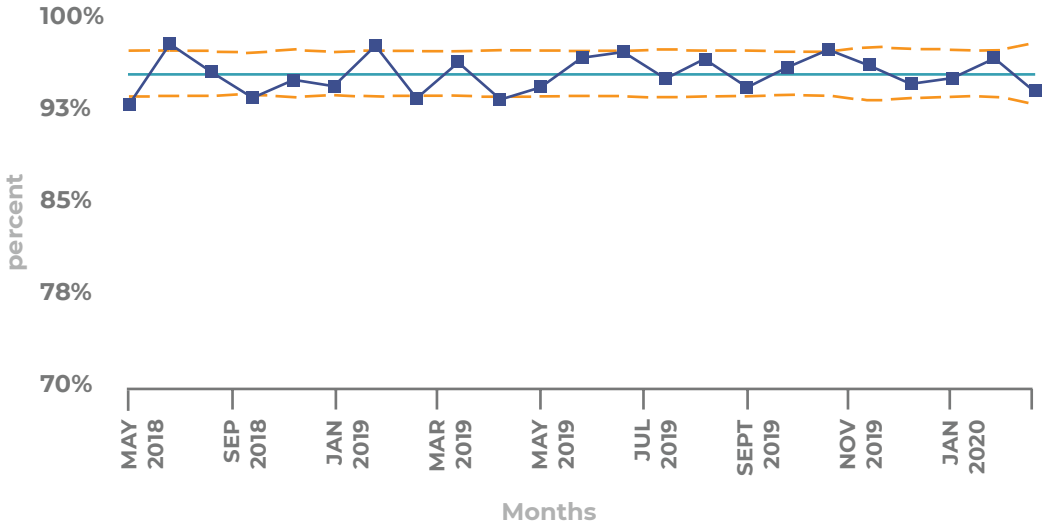
BARBARA DAVIS CENTER (BDC) PEDS INSULIN PUMP QI PROJECT

BDC tested and implemented new processes for pump training to improve HbA1c. The aim was to decrease the time from the decision to initiate pump therapy to the pump initiation. Interventions tested include shortened pump training classes, creation of online pump training, increased class offerings and space for pump training, improvement of the EMR to standardize internal communication for pump orders, offering classes at the Barbara Davis Center, and the option to do pump starts and trainings at outreach clinics, and active problem-solving skills for diabetes management. Patients receive more frequent visits, and visits are designed in a more hands-on approach to improve HbA1c outcomes. There was an increase in pump use of 8% from baseline following 22 months of testing interventions outlined above. These interventions successfully shortened the time it took to start a pump by at least one month and doubled the percentage of patients starting a pump by the 110-day goal that was set. (6)

CINCINNATI CHILDREN'S (CCHMC) DEPRESSION SCREENING

CCHMC created a multidisciplinary team to implement depression screening using the Children's Depression Inventory (CDI) as the screening tool. They successfully raised their depression screening rate to above 90% from 5% in 2010. They have maintained an adaptive screening schedule and a high level of depression screening rates. The following interventions were tested: a multidisciplinary team that met biweekly, tested the use of a paper survey to allow for quick feedback from patients, developed communication tools "Talking Points", developed depression screening algorithm, developed FAQ's, upgraded EMR for depression screening prompt and consistent documentation, added EPIC flowsheet to import score to provider note, and EPIC standard notes for social workers, transitioned to electronic forms through IT support to improve the accuracy of scores and reduce staff burden. Depression screening has been integrated into clinic workflow and the process standardized. The control chart below shows CCHMC has continued to exceed the collaborative goal of 90%.

FIGURE 7 DEPRESSION SCREENING



NATIONWIDE CHILDREN'S (NCH) HIGH-RISK PATIENT CARE SUPPORT

Nationwide Children's Hospital engaged in five areas of improvement for their T1D High-Risk patient population. First, they implemented a T1D patient registry to identify high-risk patients and implemented pre-visit clinic planning using a comprehensive wellness score for best patient care delivery. The team introduced a streamlined New-Onset T1D Diabetes Risk Assessment tool and validated its prediction efficacy. They started insulin management improvements where initiatives expanded insulin pump training, overcoming barriers to insulin care, sick day guidance, and developed a quick reference booklet. Glucose monitoring was improved as the team assisted patients' adoption of CGM technology and undertook advocacy for Medicaid eligibility for reimbursement (Figure 8). They expanded psychosocial support by piloting distress screening and tried interventions to increased follow-up capacity on annual depression screening.

FIGURE 8 PERCENT UTILIZATION OF CONTINUOUS GLUCOSE MONITORS T1D HIGH RISK* PATIENTS ≥ 2 YEARS OLD

CGM Use	3	2	5	9	5	12	5	12	15	12	12	16	17	18	26	18	36	21	33	34	21	34	40	24
Clinic Pt. Vol.	57	73	69	69	71	78	45	86	78	77	61	51	66	73	73	71	79	60	67	73	60	68	71	44

SUMMARY

Through a series of monthly calls and in-person learning sessions, ten clinical sites were able to share resources and use QI principles to test and implement changes to improve outcomes for high-risk patients. Participants expressed value in the opportunity to collaborate with others to improve clinical care for this population.

RESOURCES

https://t1dexchange.org/depression-screening-change-package/

https://t1dexchange.org/access-to-clinical-care-change-package/

https://trello.com/c/SnfX7ohi/7-building-qi-capacity-dec-2019

APPENDIX

OF ADDITIONAL RESOURCES

APPENDIX A: COLLABORATIVE CLINIC PROFILE

CLINIC	ACTIVE PATIENT POPULATION	COLLABORATIVE TEAM MEMBERS	CONTACT PERSON
CINCINNATI CHILDREN'S HOSPITAL MEDICAL CENTER	**2,166**	Dr. Sarah Corathers, Amy Grant, Justin Masterson, Dr. Jessica Kichler, Carla Allen, Francine Bugada, Rachael Jones	**Sarah Corathers** *Sarah.corathers@cchcm.org*
C.S MOTT CHILDREN'S HOSPITAL PEDIATRIC DIABETES CLINIC, MICHIGAN MEDICINE	**1,428**	Dr. Joyce Lee, Ashley Garrity, Amy Ohmer, Dr. Ram Menon, Dr. Inas Thomas	**Ashley Garrity** *ashleyna@med.umich.edu*
NATIONWIDE CHILDREN'S HOSPITAL	**1,696**	Dr. Manmohan Kamboj, Don Buckingham, Heather Larson, Ming Hong, Bethany Glick, Dr. Kajal Gandhi, Dr. Kathryn Obrynba, Natasha Childress and Michael Smith	**Don Buckingham** *Don.Buckingham@nationwidechildrens.org*
BARBARA DAVIS CENTER, UNIVERSITY OF COLORADO (Adult)	**2,564**	Dr. Sarit Polsky Amanda Rewers	**Sarit Polsky** *sarit.polsky@ucdenver.edu*
BARBARA DAVIS CENTER, UNIVERSITY OF COLORADO (Peds)	**3,712**	Dr. G. Todd Alonso, Sarah Thomas, Dr. Shideh Majidi, Katelin Thivener, Jacqueline Carmer, CPNP	**Sarah Thomas** *Sarah.3.Thomas@cuanschutz.edu*

CLINIC	ACTIVE PATIENT POPULATION	COLLABORATIVE TEAM MEMBERS	CONTACT PERSON
SUNY UPSTATE, JOSLIN CENTER (Peds)	**1,234**	Dr. Roberto Izquierdo, Margaret Greenfield	**Margaret Greenfield** *GreenfMa@upstate.edu*
SUNY UPSTATE, JOSLIN CENTER (Adult)	**2,725**	Dr. Ruth Weinstock, Dr. Marisa Desimone	**Margaret Greenfield** *GreenfMa@upstate.edu*
CHILDREN'S MERCY – KANSAS CITY Kansas City, MO	**2,159**	Dr. Mark Clements, Dr. Ryan McDonough, Dewit, Emily, Melissa Newmaster, Julie Kincheloe, Heather Feingold, Jerin Wurtz, Stephanie Wurtz, Christen Williams	**Ryan McDonough** *rjmcdonough@cmh.edu*
UNIVERSITY OF PENNSYLVANIA	**1,099**	Dr. Ilona Lorincz, Kathryn Gallagher	**Ilona Lorincz** *Ilona.Lorincz@pennmedicine.upenn.edu*
STANFORD UNIVERSITY (Peds)	**945**	Dr. Priya Prahalad, Jeannine Leverenz, Melissa Anderson	**Jeannine Leverenz** *jleverenz@stanfordchildrens.org*
STANFORD UNIVERSITY (Adult)	**1,700**	Dr. Marina Basina, Jacob Less	**Marina Basina** *mbasina@stanford.edu*
TEXAS CHILDREN'S HOSPITAL	**1,893**	Dr. Rona Sonabend, Dr. Daniel DeSalvo, Dr. Sarah Lyons, Dr. Selorm Dei-Tutu, Curtis Yee, Rick Fernandez	**Curtis Yee** *cxyee@texaschildrens.org*

CLINIC	ACTIVE PATIENT POPULATION	COLLABORATIVE TEAM MEMBERS	CONTACT PERSON
WAYNE STATE UNIVERSITY **Detroit, MI**	**400**	Dr. Elizabeth Morrison, Dr. Berhane Seyoum	**Berhane Seyoum** *bseyoum@med.wayne.edu*
UNIV. OF MIAMI, MILLER SCHOOL OF MEDICINE ADULT CLINIC **Miami, FL (Adult)**	**1,709**	Dr. Francesco Vendrame, Lisania Cardenas	**Vendrame Francesco** *FVendrame@med.miami.edu*
UNIV. OF MIAMI, MILLER SCHOOL OF MEDICINE ADULT CLINIC **Miami, FL (Peds)**	**450**	Dr. Janine Sanchez Gomez Patricia, Waks, Judy Ruth	**Janine Sanchez** *jsanchez@med.miami.edu*
LE BONHEUR CHILDREN'S HOSPITAL, UNIVERSITY OF TENNESSEE **Memphis, TN**	**600**	Dr. Ahlee Kim Dr. Grace Bazan Nelson Blake Adams Amit Lahoti	**Ahlee Kim** *akim20@uthsc.edu* **Grace Bazan** *gracebazan@gmail.com*
CHILDREN'S HOSPITAL OF LOS ANGELES **Los Angeles, CA**	**955**	Dr. Brian Miyazaki Daniel Brimberry	**Brian Miyazaki** *bmiyazaki@chla.usc.edu*
COOK CHILDREN'S MEDICAL CENTER **Fort Worth, TX**	**1,800**	Dr. Paul Thornton Dr. Susan Hsieh Dr. Mohammed Alwazeer Stephanie Ogburn Candice Williams, Christin Morell	**Susan Hsieh** *Susan.Hsieh@cookchildrens.org*

CLINIC	ACTIVE PATIENT POPULATION	COLLABORATIVE TEAM MEMBERS	CONTACT PERSON
UNIV. OF FLORIDA DIABETES INSTITUTE **Gainesville, FL**	**800**	Dr. Jacobsen Laura Dr. Janey Adams Jocelyn Dola	**Laura Jacobsen** *lauraj@ufl.edu*
SPECTRUM HEALTH, HELEN DEVOS CHILDREN'S HOSPITAL **Grand Rapids, MI**	**1,271**	Olivia G Docter Amy L Martinez	**Olivia G. Docter** *Olivia.Docter@spectrumhealth.org*
RADY CHILDREN'S HOSPITAL **San Diego, CA**	**1,504**	Dr. Carla Demeterco Christy Byer-Mendoza Kim McNamara	**Carla Demeterco** *cdemeterco@rchsd.org*
SEATTLE CHILDREN'S HOSPITAL **Seattle, WA**	**1,650**	Dr. Malik Faisal Dr. Alissa Roberts Dr. Catherine Pihoker Kevin Blake Kathryn Ness	**Malik Faisal** *Faisal.Malik@seattlechildrens.org* **Alissa Roberts** *Alissa.Roberts@seattlechildrens.org*
NYU LANGONE HEALTH, PEDIATRICS **New York, NY**	**450**	Dr. Mary Pat Gallagher Jeniece Ilkowitz	**Mary Pat Gallagher** *Marypat.Gallagher@nyulangone.org*
NORTHWELL HEALTH, COHEN CHILDREN'S MEDICAL CENTER **Queens, NY**	**547**	Dr. Jennifer Sarhis Dr. Allison Mekhoubad Aditya Bissoonauth Rashida Talib	**Jennifer Sarhis** *JSarhis13@northwell.edu*
NYU LANGONE HEALTH, ADULT **New York, NY**	**1,131**	Dr. Lauren Golden	**Lauren Golden** *Lauren.Golden@nyulangone.org*

CLINIC	ACTIVE PATIENT POPULATION	COLLABORATIVE TEAM MEMBERS	CONTACT PERSON
UNIV. OF ALABAMA AT BIRMINGHAM **Birmingham, AL**	**1,304**	Dr. Mary Lauren Scott Dr. Jessica Schmidt Tushima Treeves	**Mary Lauren Scott** *mlscott@peds.uab.edu*
EMORY UNIVERSITY, CHILDREN'S HEALTHCARE OF ATLANTA	**3,100**	Dr. Kristina Cossen Chloe Shay	**Kristina Cossen** *kristina.cossen@emory.edu*
INDIANA UNIVERSITY HEALTH	**2,000**	Dr. Anna Neyman Stephanie Woerner	**Anna Neyman** *aneyman@iupui.edu*
WEILL CORNELL MEDICINE	**250**	Dr. Alexis Feuer Isabel Reckson	*isr2007@med.cornell.edu*
LURIE CHILDREN'S HOSPITAL **Chicago, IL**	**1,450**	Dr. Naomi Fogel Naomi Sullivan	**Naomi Fogel** *NFogel@luriechildrens.org*
GRADY MEMORIAL HOSPITAL	**900**	Dr. Sonya Haw Dr. Ziemer David Dr. Inho Kim Alisha Virani Kristi Haman	**Haw Sonya** *jeehea.sonya.haw@emory.edu*
NYU LONG ISLAND **Mineola, NY**	**900**	*Sheila Dennehy* *Lori Benzoni*	**Dr. Siham Accacha** *sihamaccacha@nyulagone.org*
EINSTEIN HEALTHCARE	**500**		**Dr. Shivani Agarwal** *shivani.agarwal@einsteinmed.org*
UCSF PEDS	**1,500**	Sonali Belapurka Alison-Reed Kevin Yen	**Dr. Jenise Wong** *Jenise.wong@ucsf.edu*

CLINIC	ACTIVE PATIENT POPULATION	COLLABORATIVE TEAM MEMBERS	CONTACT PERSON
UCSF ADULT	805		**Dr. Umesh Masharani** *Umesh.Masharani@ucsf.edu*
BOSTON MEDICAL CENTER	800		**Dr. Devin Steenkamp** *desteenk@bu.edu*
CHILDREN NATIONAL HOSPITAL	1,200		**Dr. Brynn Marks** *bmarks@childrensnational.org*
MOUNT SINAI PEDS			**Dr. Robert Rapaport** *robert.rapaport@mountsinai.org*
MOUNT SINAI ADULT			**Dr. Carol Levy** *carol.levy@mssm.edu*
CHILDREN'S HOSPITAL WISCONSIN	650		**Dr. Elizabeth Mann** *eprange@wisc.edu*

APPENDIX B: PDSA EXAMPLES

Example of PDSA Cycles for Change Idea 1B (Increase technology solutions that can improve insulin dose calculations).

PDSA CYCLE 1 Test the effectiveness of a mobile technology open clinic.

PLAN On Friday 2-5pm, Sophia will set up a table to demonstrate two mobile technology solutions to improve insulin management (giving at least three boluses during the day).

PREDICTION 10 out of 15 high-risk patients aged 12 -26 years seen in the clinic during the period of the open clinic will drop in at the open house, and at least 6 out of 10 will download one of the applications.

DO Sophia creates a flyer and brochure targeted to patients struggling with glycemic management (high-risk) and shares with patients in the waiting room on the day of the open house.

Sophia set up a table with the mobile applications and frequently asked questions.

STUDY At the end of the week, the team debriefs with Sophia to answer questions such as: 1. Were there any challenges? 2. How much time did it take to set up and prepare for the open house? 3. Were the predictions met? 4. What modifications are suggested for the next PDSA?

ACT Make any recommended changes and re-test to determine if the changes are an improvement. If no suggested changes, plan additional testing the following week.

PDSA CYCLE 2: The first PDSA met expectations, and the team decided to expand the test. In PDSA 2, the team will extend the open house for three days (2 hours each day).

PLAN Next week, Sophia, Data Coordinator, will set up a table to demonstrate two mobile technology solutions for two hours on Monday, Wednesday, and Friday.

PREDICTION 18 out of 38 high-risk patients aged 12 – 26 seen in the clinic those days/hours will drop in at the open house, and at least 8 out of 18 will download the applications.

DO Sophia shares the flyer and brochure targeted to patients struggling with glycemic management (high risk) with patients in the waiting room on the days of the open house.

Sophia sets up a table with the mobile applications.

STUDY At the end of the week, the team debriefs with Sophia to ask questions such as: 1. Were there any challenges? 2. How much time did it take to set up and prepare for the open house? 3. Were the predictions met? 4. Are there any suggested changes for the next PDSA?

ACT Make any recommended changes and re-test to determine if the changes are an improvement. If no suggested changes, plan additional test for the following week.

PDSA CYCLE 3 Invite technology-savvy patients aged 12 – 26 years (with well-managed glycemic outcomes) to demonstrate mobile solutions and how they use them to improve administering at least three insulin boluses during the day.

Example of PDSA Cycles for Change Idea 2F (Use an evidence-based toolkit to encourage CGM use)

PDSA CYCLE 1 Nurse Ahmed will test the San Diego toolkit with five high-risk patients aged 12–26.

PLAN Next week Tuesday, Nurse Ahmed will test the San Diego toolkit with five high-risk patients (not currently using CGM).

PREDICTION Using the toolkit will reduce the time it takes to engage patients about blood glucose monitoring. At least two of the five high-risk patients will request a CGM.

DO Nurse Ahmed tests the toolkit.

STUDY At the end of the week, the team debriefs with Nurse Ahmed to ask questions such as 1. Were there any challenges? 2. What are some perceived barriers to high-risk patients signing up for CGM? 3. How much time did it take to complete the toolkit? 4. Was the test successful/ were the predictions met? 5. Are there any suggested changes for the subsequent PDSA tests?

ACT Make any recommended changes and re-test to determine if the changes are an improvement. If no suggested changes, plan additional tests with more patients the following day.

PDSA CYCLE 2 The team felt the San Diego toolkit took too much time and won't be a sustainable change long- term, so they decide to test the Boston toolkit, which has fewer questions, with five high-risk patients aged 12 – 26 years next week, Wednesday.

REFERENCES

1. Alonso GT, Corathers S, Shah A, et al. Establishment of the T1D Exchange Quality Improvement Collaborative (T1DX-QI). *Clinical Diabetes*. Published online February 26, 2020. doi:10.233
2. Osagie Ebekozien, MD, MPH, Nicole Rioles, MA, et al. T1D Exchange. Building Capacity Change Package. Boston, MA; October 2019.7/cd19-0032
3. Corathers SD, Schoettker PJ, Clements MA, et al. Health-system-based interventions to improve care in pediatric and adolescent type 1 diabetes. Curr Diab Rep. 2015;15(11):91. doi:10.1007/s11892-015-0664-8
4. Karamat, M. A., Dar, S., Bellary, S., & Tahrani, A. A. (2018). Clinical and Cost Implications of Insulin Degludec in Patients with Type 1 Diabetes and Problematic Hypoglycemia: A Quality Improvement Project. Diabetes Therapy, 9(2), 839–849. https://doi.org/10.1007/s13300-018-0400-x
5. Nguyen, T. M., Mason, K. J., Sanders, C. G., Yazdani, P., & Heptulla, R. A. (2008). Targeting Blood Glucose Management in School Improves Glycemic Control in Children with Poorly Controlled Type 1 Diabetes Mellitus. *The Journal of Pediatrics*, 153(4), 575–578. https://doi.org/10.1016/j.jpeds.2008.04.066
6. Alonso, G Todd et al. "Improving the Insulin Pump Initiation Process for Pediatric Patients with Type 1 Diabetes through Application of Lean Quality Improvement Methods." The Permanente Journal vol. 22 (2018): 17-147. doi:10.7812/TPP/17-147