

Improving Processes and Outcomes: An Evaluation of the Extra Care Initiative at the Barbara Davis Center’s Pediatric Clinic

Background

Type 1 Diabetes (T1D) affects one in 300 people under the age of 18 and has various associated complications, including diabetic ketoacidosis (DKA), and hypoglycemia, as well as comorbidities such as depression and disordered eating^{1,2}. Lack of continuous and comprehensive care can lead to uncontrolled diabetes, which can place diabetic patients at an increased risk for severe complications like DKA and hypoglycemia, as well as at risk for long-term vascular complications^{3,4,5}. To address the concerns of high-risk T1D patients (high HbA1C levels) including loss-to-follow-up and continuity of care, the Barbara Davis Center’s (BDC) Pediatric Clinic implemented the T1D Extra Care Initiative.

Evaluation

Using electronic healthcare records (EHR) and Colorado Medicaid claims data, as well as BDC Extra Care Initiative team member interviews, this evaluation explored the impact of the T1D Extra Care Initiative on pediatric diabetic patients’ access to care, quality of care, and healthcare utilization related to a T1D diagnosis.

Program Description

The BDC T1D Extra Care Initiative team received supplemental funding (UPL) in early 2020. Using this funding, they built a multidisciplinary team with a focus on integrated behavioral health support and patient navigators to promote continuity of care for patients under the age of 19. Figure 1 summarizes the four patient-centered care domains of the Extra Care Initiative. Three patient navigators are tasked with supporting three critical elements of T1D care: 1) scheduling (follow-up visit scheduling and ensuring patients are seen at least once every 180 days, bilingual support with scheduling); 2) resource navigation (supplies, transportation, elimination of other barriers); 3) depression screening and monitoring. The behavioral health team, consisting of licensed clinical social workers and a psychologist, provide in-clinic and telehealth support for patients who are learning about their new diagnosis, managing depression, or navigating disordered eating. Additionally, many members of the Extra Care Initiative team work on quality improvement (QI) efforts, continuously seeking to improve the processes and procedures of the Extra Care Initiative.

Patient-Centered Care Domains			
Care Coordination and Continuity	Patient Navigation	Integrative Behavioral Health	Quality Improvement
Education on T1D diagnosis, connection to resources such as support groups and financial assistance, and frequent check-ins with patients and families. Efforts to get patients in quarterly, with 180 days as the ideal max.	Regular timely contact with patients and their healthcare teams to identify and address patients' needs. Dedicated services with each patient navigator focusing on different components of care.	Screening for behavioral health issues. Referrals to external behavioral health providers. Psychologist provides therapy for patients who develop disordered eating following diagnosis.	Oversees rapid, real-time improvements in the implementation process. Develop methods to accurately identify and track high-risk patients for inclusion in the program.

Figure 1. Four domains of the Extra Care Initiative

¹ Ravi, S.J., Coakley, A., Vigers, T., Pyle, L., Forlenza, G., and Alonso, T. (2021). Pediatric Medicaid Patients with Type 1 Diabetes Benefit from Continuous Glucose Monitor Technology. *Journal of Diabetes Science and Technology*, 15(3), 630-635.

² Alonso, T., Coakley, A., Pyle, L., Manseau, K., Thomas, S., and Rewers, A. (2020). Diabetic Ketoacidosis at Diagnosis of Type 1 Diabetes in Colorado Children, 2010-2017. *Diabetes Care*, 43 (1), 117-121.

³ Gayoso, M., Lim, W.Y., Mulekar, M.S., & Kaulfers, A-M S. (2021). Effect of Covid-19 Quarantine on Diabetes Care in Children. *Clinical Diabetes and Endocrinology*, 7(9):1-7.

⁴ Kharado, I., Coppedge, E., & Antal, Z. (2019). Care of Children and Adolescents with Diabetes Mellitus and Hyperglycemia in the Inpatient Setting. *Current Diabetes Reports*, 19(85):1-10.

⁵ Jacobson, A.M., Braffett, B.H., Cleary, P.A., Gubitosi-Klug, R.A., & Larkin, M.E. (2013). The Long-Term Effects of Type 1 Diabetes Treatment and Complications on Health-Related Quality of Life: a 23-year Follow-up of the Diabetes Control and Complications/Epidemiology of Diabetes Interventions and Complications Cohort. *Diabetes Care* 36(10).

QUANTITATIVE ANALYSIS

Methods Overview

Patients were included in this evaluation if they were 18 years old or younger at their last completed encounter with BDC, had an HbA1c level of $\geq 10\%$ for patients younger than 11 years or $\geq 12\%$ for patients aged 11 to 18, had two or more completed encounters with BDC in the evaluation period, were newly diagnosed with T1D, and had Medicaid listed as their payor on at least one completed encounter during the evaluation period. Patients were placed into one of three groups based on when they met the evaluation criteria: pre-Extra Care Initiative 8/31/18-2/29/20 (pre-implementation), at the height of the COVID-19 pandemic with the Extra Care Initiative from 3/1/20-12/31/21 (COVID-19 period), and post-COVID peak with the Extra Care Initiative from 1/1/22-6/30/23 (post-COVID implementation).

The quantitative analysis characterizes and compares the patient characteristics, encounter information, and depression screening rates between the three patient groups. Patient characteristics, BDC encounter data, and depression screening data are obtained from the EHR. Hospitalizations and emergency department visits were extracted from Colorado Medicaid claims data. Healthcare utilization is measured through hospitalization and emergency department visits related to T1D that occurred within 210 days of a patient’s first visit with BDC and compared using t-tests. Outcomes of healthcare utilization and county reach are compared between only the pre- and post-implementation groups. Though all patients in this evaluation were identified as having Medicaid as a payor on an encounter, claims data was only extracted for those with a valid Medicaid ID listed within their patient chart in the EHR.

Results

Over this 58-month evaluation period, BDC had 341 patients that met our evaluation criteria. One hundred nine of those patients (32%) were seen in the pre-implementation period, 134 (40%) were seen during the COVID-19 period, and 98 (29%) were seen in the post-COVID implementation period. Ethnicity, gender, county type of residence, and age at first visit were similar across the three groups. Following program initiation (i.e. COVID-19 and post-COVID implementation), BDC saw an increase in the percentage of their population that were Hispanic or primarily Spanish speaking. Additionally, percentages of their patients reporting using pumps or continuous glucose monitors also increased during the COVID-19 and post-COVID implementation time periods.

Table 1: Patient Characteristics and Supply Usage Between Groups

	Pre-Implementation (N=109)	COVID-19 Period (N=134)	Post-COVID Implementation (N=98)	Overall (N=341)
<i>Standard Demographics</i>				
Caucasian	70 (64.2%)	81 (60.4%)	62 (63.3%)	213 (62.5%)
Female	49 (45.0%)	59 (44.0%)	42 (42.9%)	150 (44.0%)
Hispanic ethnicity	32 (29.4%)	54 (40.3%)	47 (48.0%)	133 (39.0%)
Primary language				
English	101 (92.7%)	101 (75.4%)	78 (79.6%)	280 (82.1%)
Spanish	7 (6.4%)	25 (18.7%)	16 (16.3%)	48 (14.1%)
Urban Colorado county of residence*	86 (78.9%)	108 (80.6%)	72 (73.5%)	266 (78.0%)
Age at diagnosis (years), mean (StDev)	10.1 (4.2)	9.8 (4.0)	9.5 (3.8)	9.8 (4.0)
<i>Supply Usage</i>				
Pump use	17 (15.6%)	27 (20.1%)	44 (44.9%)	88 (25.8%)
Continuous glucose monitor use	56 (51.4%)	100 (74.6%)	76 (77.6%)	232 (68.0%)

Note: StDev = standard deviation; 13% of overall patients lived outside of Colorado

Over the evaluation period, 341 patients had a total of 4718 scheduled visits, most of which (74%) were completed as scheduled. Following the COVID-19 and post-COVID implementation periods, no-show rates and cancellation rates dropped. Furthermore, a higher percentage of patients left their completed visit having their follow-up visit scheduled. However, the pre-implementation period had the highest rates (65%), and the post-COVID implementation period had the lowest rates (52%) of patients being seen within 90 days of their first visit.

Table 2: Scheduled Encounters and Time Between First Visit and Follow-Up

	Pre-Implementation (N=1422)	COVID-19 Period (N=2334)	Post-Implementation (N=962)	Overall (N=4718)
Scheduled Visits				
Completed	1016 (71.4%)	1704 (73.0%)	764 (79.4%)	3484 (73.8%)
Left visit with follow-up scheduled	140 (13.8%)	210 (12.3%)	160 (20.9%)	510 (14.6%)
No show	93 (6.5%)	121 (5.2%)	45 (4.7%)	259 (5.5%)
Cancelled	313 (22.0%)	509 (21.8%)	153 (15.9%)	975 (20.7%)
Same day cancellation	103 (32.9%)	174 (34.2%)	45 (29.4%)	322 (33.0%)
Time Between First Visit and Follow-up				
Up to 90 days	185 (65.4%)	227 (61.4%)	187 (51.7%)	599 (59.0%)
Up to 180 days	277 (97.9%)	353 (95.4%)	342 (94.5%)	972 (95.8%)

Note: Nearly all encounters were in-person; only 2% of post implementation visits were telehealth

The depression screening tools used by BDC providers, the Patient Health Questionnaire 8-item and 9-item (PHQ-8 and PHQ-9), are only validated for use with patients over the age of 12, meaning most (68%) of our evaluation patients were not eligible for screening. However, for those who were eligible, screening rates improved substantially in the post-COVID implementation period.

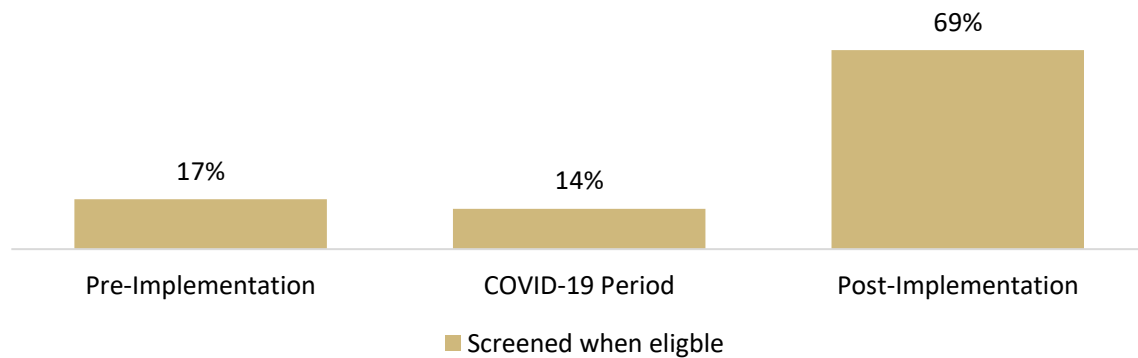


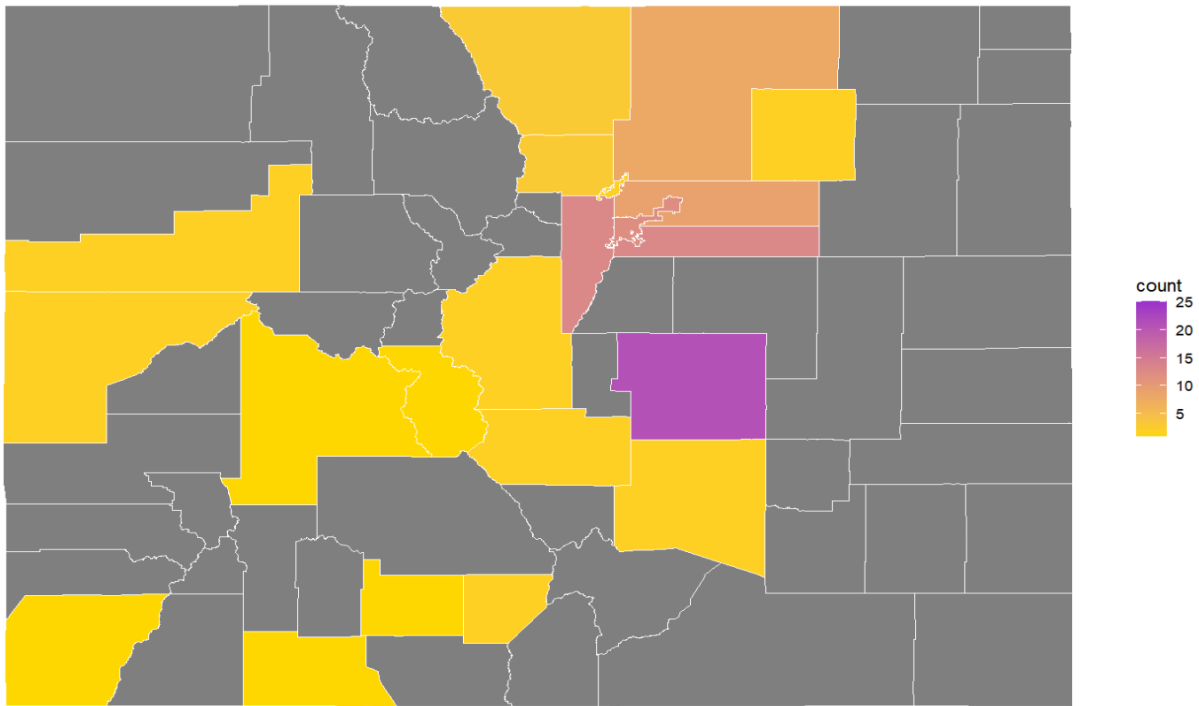
Figure 2. Depression screening rates for eligible BDC patients

Of the 207 patients in the pre- and post-COVID implementation groups, 174 had valid Medicaid IDs within their patient chart. Of those 174 (N=96 for pre-implementation and N=78 for post-COVID implementation), only 52 patients (30%) had Medicaid claims submitted for a hospitalization or ED visit related to DKA or hypoglycemia within 210 days of their first visit with BDC. Three patients had a hypoglycemia event, and 49 patients had DKA recorded in the claims export. Healthcare utilization due to diabetic ketoacidosis (Table 3) was not significantly different between groups ($p < 0.05$).

Table 3: Healthcare Utilization Between Pre- and Post-COVID Implementation for Diabetic Ketoacidosis (DKA)

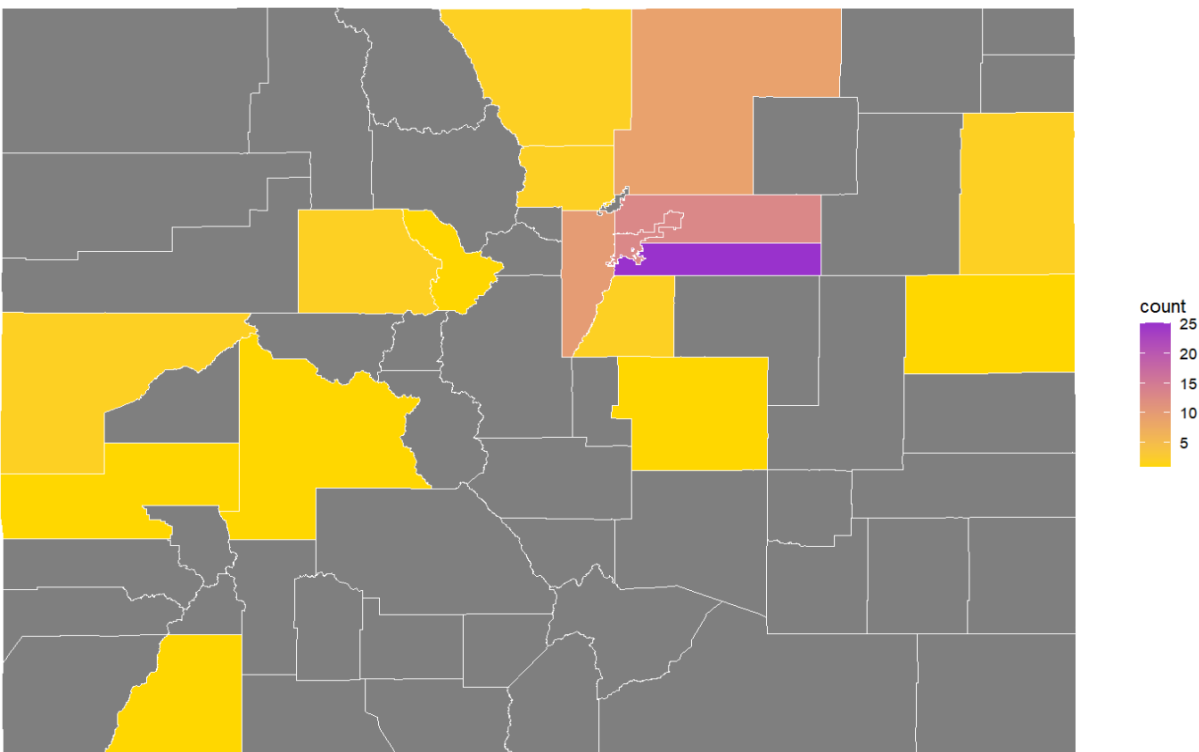
	Pre-Implementation (N=26)	Post-Implementation (N=23)	p-values
Hospitalization for DKA	17 (65.4%)	16 (69.6%)	1.0
ED visit for DKA	9 (34.6%)	7 (30.4%)	

Figures 3 and 4 demonstrate the reach of the BDC pediatric clinic by Colorado county between pre-implementation and post-COVID implementation. While both time periods served primarily urban residing patients, the pre-implementation period had a higher rate of frontier/rural patients and served more patients outside of the Denver Metro Area than the post-COVID implementation period.



Note: 6 out-of-state patients excluded from visual

Figure 3. Pre-implementation Colorado BDC reach by county (N=109)



Note: 10 out-of-state patients excluded from visual

Figure 4. Post-COVID implementation Colorado BDC reach by county (N=98)

FEEDBACK FROM TEAM MEMBER INTERVIEWS

Interviews were conducted with thirteen BDC team members, including one QI team director, one QI coordinator, three social workers, one lead medical assistant, three patient navigators, one telehealth coordinator, one psychologist, one database manager, and one EHR analyst. Their responses were thematically analyzed into domains of project successes and project challenges.

Project Successes

Team members felt that improved access to care was a key benefit of the program. With a system in place to identify high-risk patients, the team can reach out to and build relationships with those that need extra assistance. This extra contact allows the time to pinpoint any barriers to care these patients are experiencing such as trouble obtaining needed supplies or transportation to an appointment. The Extra Care Initiative team then acts on the patient's behalf to reduce those barriers when possible. As one team member said, "I'll message someone, help them set up an appointment, and a few weeks later I'll see them make it to that appointment. When they [originally] hadn't made it in six months or a year...[that's] the success I see."

"That's what our team is specialized in doing...helping to bridge the connection gaps there for access."

Project team members also cited reduction in loss to follow-up as a major success of the Extra Care Initiative. The team began using a "loss to follow-up" report to identify patients who were most at-risk for stopping care. Team members use targeted outreach for these patients, which has led to a dramatic reduction in the number of people identified in the report. One team member shared "when I started, there was over 500 patients that were [identified as needing] extra care...now I think there's 70." Team members credit this reduction to the accuracy of the reports being run, the cadence of outreach, the various forms of outreach (i.e. text message, email, phone, and letter), and taking the time to figure out how to provide for each patient's individualized needs.

"It's so easy to fixate on the basic medical needs but there's so much more that gets involved."

Other notable successes include aiding patients in attaining behavioral healthcare by improving depression screening rates and making referrals to behavioral health providers on behalf of patients with a positive screening, and the overall efficiency of the team itself. Having a multidisciplinary team with dedicated roles frees up time for providers to do their own jobs and increases communications with patients which leads to focused outreach to better understand a patient's diagnosis and their individualized needs and challenges. Team members also noted that the quality improvement team has created

better processes and procedures. Thus, by constantly thinking of ways to enhance outreach, make scheduling easier, or understand patients, the care patients are receiving is continuously improving.

Project Challenges

One barrier shared by the team was the lack of structured training offered to team members. Many team members shared they learned by shadowing but felt they didn't fully understand some components of their job, such as aspects of patient navigation, the EHR system, effective outreach through various mediums, resources available to patients, and how to build a relationship with patients. One suggestion for improving this was to determine which type of training is most needed for multiple team members and use project funds to offer that training as professional development for the team.

Another commonly shared challenge was the lack of behavioral health provider time available for clinical services. One team member emphasized the severe understaffing of psychological services by sharing "we have 4000 pediatric patients and one part-time psychologist [who only has 4 hours a week of clinical time]." Additionally, while there are three social workers on the Extra Care Initiative team, most are not providing therapy services, limiting the care they can offer. One suggestion to increase staffing and clinical time was to examine other departments' ratio of psychological services to patients and follow their approaches.

RECOMMENDATIONS TO THE PROJECT TEAM

Findings from the data and themes from conversations with team members indicate areas for program improvement, which are outlined for consideration below.

Improving access to care is a focus of the Extra Care Initiative, but **only half of patients seen in the post-COVID implementation evaluation period had a follow-up visit within 90 days of their first visits**, despite quarterly visits being the recommendation for T1D care.

Recommendation 1: Continue to strategize and leverage quality improvement tools (such as Epic automated bulk outreach and ticketed scheduling) to get patients coming in for follow-up visits, especially when they are newly diagnosed and learning how to care for themselves.

While getting follow-up visits scheduled during a completed visit did improve during the post-COVID implementation evaluation period, **only 21% of patients left having a scheduled follow-up visit**.

Recommendation 2: Continue to dedicate resources to helping patients get their follow-up visit scheduled when they are completing a visit to improve follow-up rates.

Improving the rates of depression screening among patients is a focus of the Extra Care Initiative, but **most patients seen by BDC Pediatric Clinic are ineligible to be screened** with the tools being used. While the current recommendation is for screenings to be for patients over the age of 12, the American Psychological Association is collecting data on the usefulness of screening patients 11 and older.

Recommendation 3: Consider whether the PHQ-A (PHQ-9 modified for adolescents) is appropriate for use at BDC, as it is validated for used for patients 11-18.

Improving access through convenience of encounters and reach to rural/frontier areas of the state are elements of the Extra Care Initiative, but **nearly all post-COVID visits were in person and served a higher percentage of urban patients** than the pre-implementation period.

Recommendation 4: Consider increasing the number of telehealth visits offered, where appropriate, and how to reduce barriers in accessing care to patients living further away from the BDC clinic.

Team members shared a desire to have **more structured training** offered, particularly when onboarding and to participate in professional development.

Recommendation 5: Compile a list of the trainings necessary for team enhancement through discussion with the BDC Extra Care Initiative team. Develop a dedicated onboarding and training process. Seek out other health system opportunities for Epic training. Seek funding support to offer team professional development.

Further qualitative feedback would provide valuable insights into the impact of the Extra Care Initiative on the patients and families it serves. While the quality improvement team has conducted some surveys on barriers to care and patient needs, **feedback on satisfaction with the program would be useful for the team**.

Recommendation 6: Consider implementing a post-visit survey to elicit feedback from both patients and families on satisfaction, trust with the project team members, and any recommendations for improvement.