Effect of Remote Patient Monitoring on Subsequent 3-month Hemoglobin A1c in Youths and Young Adults with Type 1 Diabetes with Suboptimal Glycemic Control

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Disclosures

No conflicts of interest



About Children's Mercy

Children's Mercy Diabetes Population

- 2,500 patients with Type 1
- 275 patients with Type 2

Staffing

- 2,900 Pediatric endocrinologists
- 5 APRN
- 27 Nurses; 16 FTE (15 with CDCES certification
- 5 Dieticians (4 with CDCES certification)
- 5 Social Workers
- 2 Psychologists

Background/Objective

- Remote Patient Monitoring (RPM) Telehealth intervention
 - Offered free of charge to those eligible
 - No new onset included; minimum 6 months since Dx
 - Minimum HbA1c 7.2%
- Multiple Referral Sources

•

- Predictive models
- Provider Referral
- 2 HbA1c's \geq 9.0% within the last 12 months (High A1c List)

Methods

• Retrospective analysis 2020-2023

- Inclusion/Exclusion
 - No more than 90 days between qualifying HbA1c

date and contact regarding RPM

 Must have HbA1c result at least 90 days after first completed RPM visit

Inclusion/Exclusion

120 patients were eligible for RPM via the 2 High HbA1c's ≥9%

> 57 were excluded because they were not able to be contacted

10 were excluded due to a lack of follow-up HbA1c result recorded at CMH

63 patients were contacted regarding RPM the 2 High HbA1c's ≥9% 53 patients were contacted regarding RPM due to eligibility the 2 High HbA1c's ≥9% and had a HbA1c result recorded at CMH

> 6 were excluded due to their only available HbA1c Result being too close to the date of offer/consent

1 was excluded because the time between Baseline HbA1c and consent for RPM was too short

47 patients were contacted regarding RPM due to eligibility the 2 High HbA1c's ≥9% and had a HbA1c result recorded at CMH following the date of contact 46 patients were contacted regarding RPM due to eligibility the 2 High HbA1c's ≥9% and had a HbA1c result recorded at CMH following the date of contact

Final Cohort

Demographics

	Cohort	Completers	Non-Completers
Total No	46	20	26
Sex			
Female	17 (37%)	7 (35%)	10 (38.5%)
Race			
White	28 (60.9%)	12 (60%)	16 (61.5%)
Black	8 (17.4%)	4 (20%)	4 (15.4%)
American Indian or Alaska Native	1 (2.2%)	1 (5%)	0 (0%)
Multiracial	5 (10.9%)	2 (10%)	3 (11.5%)
Asian	1 (2.2%)	0 (0%)	1 (3.8%)
Hispanic	2 (4.3%)	0 (0%)	2 (7.7%)
Declined	1 (2.2%)	1(5%)	0 (0%)
Duration of T1D at baseline (years)	3.8 (2.3-9.5)	3.4 (2.2-9.3)	4.2 (2.4-9.5)
CGM Present at Baseline	38 (82.6%)	17 (85%)	21 (80.1%)
Pump Present at Baseline	27 (58.7%)	13 (65%)	14 (53.8%)
Baseline HbA1c	10 (9.1-12.2)	10.2 (9.2 - 12.6)	9.8 (9.1-11.7)

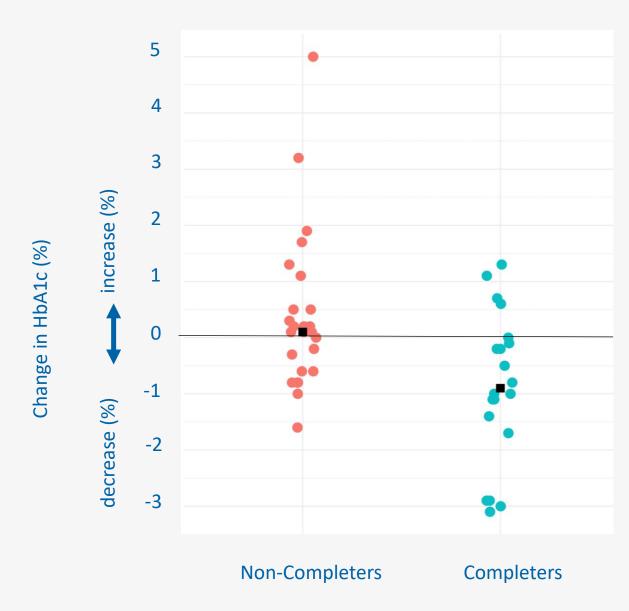


Figure 1. Change in HbA1c (%) in non-completers (n=21) versus completers (n=15). The black squares represent the median change in HbA1c (%) in each group.

Next Steps

• Larger Matched Cohort

• Dose effect of visits

• Implementation of High A1c list as introductory recruitment method



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Leveraging EMR Data to Enable Remote Patient Monitoring in the ROCKET T1D Program

Daniel J. DeSalvo, MD^{1,2}; Rona Sonabend, MD^{1,2}; David Schwartz, PhD, ABPP^{1,2}; Kelly Timmons, RN, BSN²; Sarah K. Lyons, MD^{1,2}

Texas Children's Hospital/Baylor College of Medicine Houston, TX



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PRESENTER DISCLOSURES

- Independent consultant to Dexcom and Insulet
- Patent: D3 hypoglycemia prediction algorithm

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ROCKET T1D RPM PROGRAM

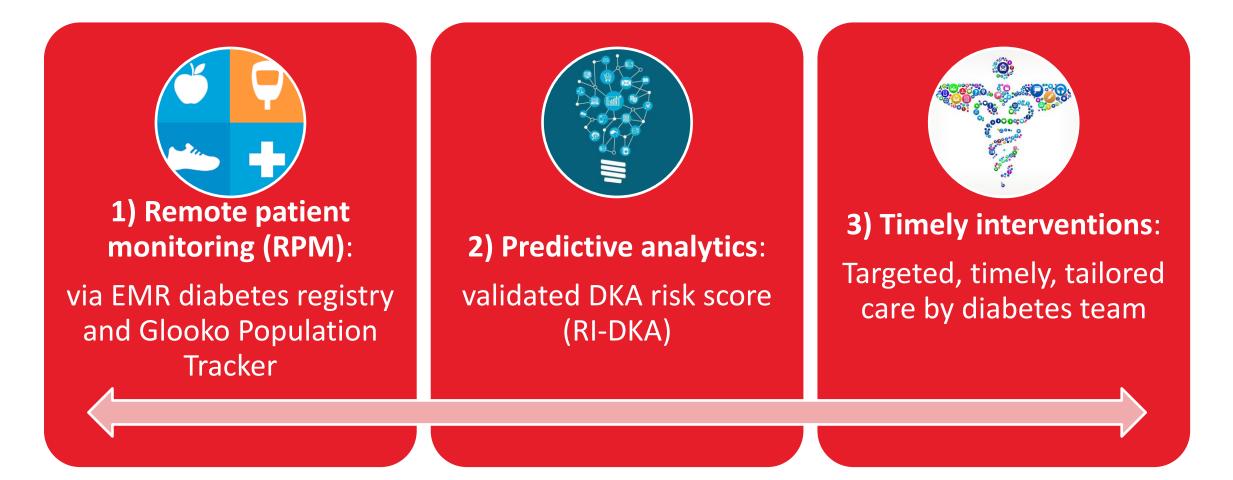


<u>**R**</u>emote <u>**O**</u>utreach & <u>**C**</u>are for <u>**K**</u>ids' <u>**E**</u>mpowerment and <u>**T**</u>echnology use in <u>**T1D**</u>

 Overarching Aim: To empower youth and their families to leverage emerging technology, improve diabetes selfmanagement habits, and achieve their self-care goals to thrive with T1D



3 MAJOR COMPONENTS OF PROJECT



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- Launch: Active participation phase with clinical outreach focused on diabetes management habits
- Orbit: RPM phase with periodic data review and therapy adjustment if needed
- Team: CDCES, Social Worker, Care Coordinator, MD, APP, Fellow meet weekly (Mission Control Meetings)

Target Population:

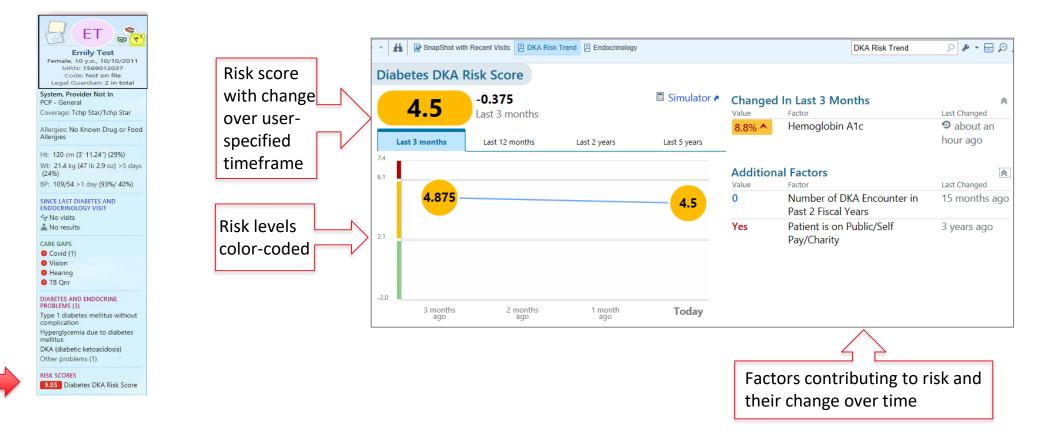
- All new onset T1D patients
- Established patients with
 - Moderate to high RI-DKA score
 - Starting new technology
 - Recent DKA

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PREDICTIVE ANALYTICS

Incorporates validated DKA risk score (RI-DKA)



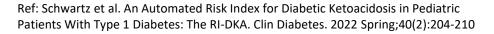
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Texas Children's*

Baylor

College of

Medicine



LAUNCH PHASE: ANCHORED BY THE 6 HABITS

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Original Investigation | Diabetes and Endocrinology Feasibility of Electronic Health Record Assessment of 6 Pediatric Type 1 Diabetes Self-management Habits and Their Association With Glycemic Outcomes

Joyce M. Lee, MD, MPH; Andrea Rusnak, MS; Ashley Garrity, MPH; Emily Hirschfeld, BA; Inas H. Thomas, MD; Michelle Wichorek, PhD; Jung Eun Lee, MS; Nicole A. Rioles, MA; Osagie Ebekozien, MD, MPH, CPHQ; Sarah D. Corathers, MD

Ref: Lee et al. JAMA Network Open. 2021;4(10):e2131278

In collaboration with Joyce Lee, MD MPH; Ashley Garrity, MPH; and Justine Ross





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EMR TOOLS: TCH DIABETES REGISTRY

「CH Diabetes Registry ∽						**
My Diabetes Patient Reports Last Refresh: 03:09:23 PM Provider Specific Registry Reports My Diabetes Patients	TCH ROCKE All Patients R (includes all n	egistry netrics)	esults expired: Fri 9/29 03:02 PM	@ ▶ 🛛 🗄	Diabetes Patients Reports Last Refresh: 03:09:23 PM Diabetes Registry High Risk / Social Work- Minimal Metrics Diabetes Registry High Risk / Social Work- Minimal Metrics - Active Diabetes Registry High Risk / Social Work- Minimal Metrics - Inactive	٢
Department Specific Registry Reports Registry Patients by Location Diabetes Qlikview Application	ROCKET	ROCKET T1D ORBIT Registry	esults expired: Fri 9/29 03:03 PM	Q • E :	Diabetes Registry Administration- primary T1/T2 Bulk Communication Report Diabetes Care Coordinator Report Diabetes Registry USWNR- primary	
Qlikview Application	LAUNCH Registry		O Due Today	Howt 10 Days	ROCKET T1D Registry Summary © Report completed: Fri 9/29 03:09 PM	() E
Clinic Process Team Aims Last Refresh: 03:09:23 PM				⑦ Ⅰ : 280	RT1D Phase Graduated from ROCKET T1D Program	Total Patients
Has Eye Exam Completed Past 2 Year (Types 1 & 2) Has Microalbumin/Creatinine Ratio Past 1 Yr (Types 1 & 2)	~_ <u>77 %</u> 77 % 77 %	[No Value]		61 11 208	Launch (Phase 1) Launch established T1D (Phase 1) Launch new onset T1D (Phase 1) Launch: graduation/not progressing to orbit	56
Has Lipid Panel Past 5 Years (Types 1 & 2) Has TSH Past 2 Years (Type 1) Has 4 or More Endocrine Visits Past 1 Year (Type 1) Has RD Encounter Past 1 Year (Types 1 & 2)		egistry Reports st Refresh: 03:09:24 PM REACH		© :	Launch: new onset T1D (Phase 1) Launch: withdrawal Orbit (Phase 2) Orbit withdrawal	6 3 28
Community Team Aims Last Refresh: 03:09:24 PM	© : A	My Active REACH Patients (Care Tea Active Patients nactive Patients nactive Patients With Rising Risk	m)		[No Value] ROCKET T1D Reports	2
Received School Packet Past 12 months (Types 1 &) Received Flu Vaccine in Past 6 months (Types 1 & 2)	69 % 68 % <td< td=""><td>Outreach Reports SW Patients Due For Outreach Active Patients Scheduled Next 7 Da</td><td></td><td></td><td>Last Refresh: 03:09:24 PM Active Phase LAUNCH Established Patients Active Phase LAUNCH New Onset Monitoring Phase ORBIT Patients</td><td></td></td<>	Outreach Reports SW Patients Due For Outreach Active Patients Scheduled Next 7 Da			Last Refresh: 03:09:24 PM Active Phase LAUNCH Established Patients Active Phase LAUNCH New Onset Monitoring Phase ORBIT Patients	
At Risk Team Aims Last Refresh: 03:09:24 PM	(D):	Canceled/No Show Appointments: Pa	ist 2 Weeks		Graduated Patients CDCES: Patients Due For Follow Up Next 7 Days	

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•	Endocrine ROCKET T1D: Patient	s Due For Follow Up Next	7 Days [9829026] as o	of Fri 7/29/2022 9:31 A	М				⑦ ₽ X
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Complex Vital Signs Intake/Output LDA Assessment Respiratory Flowsheet ROCKET	the second s	08/05/2022	Other Mission Cen		Orbit (Phase 2)) Type 1 03/09	2020	2 (09/18/2020
C Expanded View All	1m 5m 10m 15m 30m 1h 2h 4 Note Only from 6/5/2023	h 8h 2 5/5	Check in Week 3 Mission Cen	a s Constant a state state state	Graduated from ROCKET T1D Program		2014	0	
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ROCKET T1D Details		1.11							
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6 Self-Management Habits	Launch: established T1D (Phase 1)								
Habit #1: Blood glucose checking frequency on download	Launch: new onset T1D (Phase 1)								
Habit #2: Average # of bolus insulin doses per day on download (for pump) and patient report	Launch: withdrawal								4
Habit #3: Type of intensive therapy	Launch: graduation/not crogressing to or	bit							
Habit #4: Timing of insulin with meals	Orbit (Phase 2)								
Habit #5: Times blood glucose or insulin data were downloaded and reviewed for blood glucos	Orbit withdrawal			Ŧ					>
Habit #6: Times insulin was adjusted by family or by diabetes team since the last diabetes clin	Graduated from ROCKET T1D Program	Dcial 🔋 Care Team / Visi	Details 📱 Risk Profile 📱 DKA Ris	sk Trend 📃 Registry Details				<i>₽</i> - ₽ ₽	On 🕐
CDCES ROCKET T1D Follow Up			Allergies *		1	✤ Outpatient Medic	ations a	Meds Overv	rview ^
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CDCES Follow Up Need				n support by reconciling outside in		Enable clinical decision	a support by reconciling	Last Edited	
*			Azithromycin High - Hives Fish-derived Product High - Anaphylaxis	ts Cefzil [cefproz High - No reacti Penicillins High - Hives, Itc	ions specified	acetaminophen PO CHEN Give 1 Tablet by mouth eve pain or fever, temp >101F.	ery 6 hours as needed fo	9 months ago or	
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4	Modify								2 results

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OUTREACH DOCUMENTATION VIA FLOWSHEETS

Flowsheets
Diabetes Self-Mgmt Be Time with patient Complex Vital Signs Simple Vital Signs Pediatric Head To Toe Newborn Head To Toe A Pediatric Daily Cares Newborn Daily Cares Pediatric Advanced Wa Diabetes Self-Mgmt Pediatric Advanced Wa P
Accordion Expanded View All A the set of the
OTHER 1 time/day Using dyname discipling togetaper year on download (for pump) and patient report (for MDI) 3 4 times/day Type of strain's through 1 monodiality be Times blood glucose or insulin data were downloadd and reviewed for blood glucose patterns since the last diabetes c 3 times Times insulin was adjusted by family or by diabetes team since the last diabetes c 3 times 9 times/day 1 times/day 0 times/day 1 times/day

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RPM USING GLOOKO POPULATION TRACKER

glooko Name 🗸	Q Enter a patient name	тсн Р	- Pediatric Endocrinology 👻 DD 👻
Assign Devices	View Patients	Switch to legacy patient list	Create Patient Account
Filter Patients 1-15 of 5031 Q. Search Filters Provider	st Sync 🔻	Flags Taj	gs
Daniel DeSalvo No Provider Tag	day	4	+
 Extra care/at-risk (main campus) Rocket t1d - orbit phase Rocket t1d - launch phase 	day	+	e de la companya de la

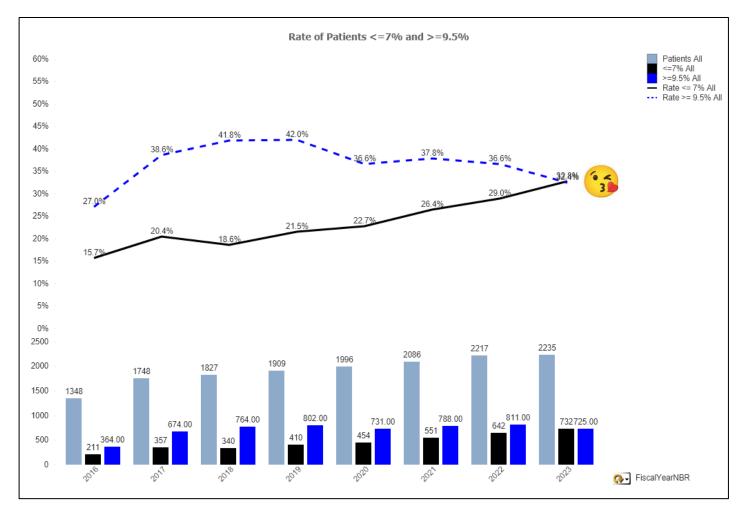
- Syncs data in real-time
- Access remote data on-demand as interactive reports
- EMR integration

Hyperspace – MW ENDOCRINE CLNC – TST – TCH MD INTEGRATED DUAL TEST 🔚 Epice 📲 🗄 Schedule 🔒 Appts 🚯 Patient Station 🦞 Encounter 📋 Orders Only 🚦 Patient Lists 🛗 Chart 🚘 In 🛗 🚛 🖓 🖓 Test, Glooko Demo GT 🖉 🖉 🔶 SnapShot 🔘 Chart Review Rooming Screening Flowsheets Glooko D. Test Female, 7 y.o., 5/9/2016 🕞 Eile 🖫 Add Bows 🕂 LDA Avatar 🔹 mt Add Col nin insert Col < Data Validate 🐇 MRN: 2000349836 Code: Not on file Complex Vital Signs Intake/Output VP/FM Hx Soc/Bhv Hx Gross Motor Exam O Expanded O View All Care Team: No PCP Hide All Show All Appointment from CLONE, TCH MD INT DL ENDOCRINE ASAP 6/15/2023 SMBG Data **Ref Provider** 11:07:05 CGM Primary Cvg: Blue Cross Blue S. CGM Pump Allergies: Not on File 159 Average Devices 39 Standard D. 12:30 PM EN EOS **OUESTIONNAIRE EST** 150 Median No vital signs recorded for this 92.85 Active Time encounter Glucose Ma 7.1 LAST JYR 13 Days Worn 9. No visits Coefficient . 24.8 A No results Time Very B. CARE GAPS Time Below. HepB (1 of 3 - 3-dose series) 73 Time In Ran Hunger Qnr 23 Time Above. IPV (1 of 3 - 4-dose series) Time Very A. 4 2 Covid (1) Pump 2 7 more care gaps 54.5 **Total Insulin DIABETES AND ENDOCRINE Total Bolus** 16.8 PROBLEMS (0) 37.7 **Total Basal** Other problems (0) Average Bo Lab Preference: TCH LAB [204] Automated Pt Rx Pref: None Devices Brand 1 Ascensia + ADD ORDER E + ADD DX (0) Start Review

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ACKNOWLEDGEMENTS AND GRATITUDE

• HELEONA M. AND HARRY B. CHARITABLE TRUST G-2206-05307



Clinical team, including CDCES, social workers, care coordinator, community health worker, APPs, fellow

- Kelly Timmons, BSN, RN
- Don Buckingham, MBOE, CPHQ
- Youth with diabetes and their families

PEDIATRIC DIABETES & ENDOCRINOLOGY



November 15, 2023

The Design of the Electronic Health Record in Type 1 Diabetes Centers: Implications for Metrics and Data Availability for a Quality Collaborative

Donna S. Eng, MD¹; Emma Ospelt, MPH²; Brian Miyazaki, MD³; Ryan McDonough, DO, FAAP⁴; Justin A. Indyk, MD, PhD⁵; Risa Wolf, MD⁶; Sarah K. Lyons, MD⁷; Anna Neyman, MD⁸; Naomi R. Fogel, MD⁹; Marina Basina, MD¹⁰; Mary Pat Gallagher, MD¹¹; Osagie Ebekozien, MD, MPH, CPHQ¹²; G. Todd Alonso, MD¹³; Nana-Hawa Yayah Jones, MD¹⁴; Joyce M. Lee, MD, MPH¹⁵

¹Michigan State University Helen DeVos Children's Hospital; ²T1D Exchange, Quality Improvement and Population Health; ³Children's Hospital of Los Angeles; ⁴Children Mercy Hospitals and Clinics; ⁵Nationwide Children's Hospital; ⁶Johns Hopkins University; ⁷Baylor College of Medicine; ⁸University Hospitals Rainbow Babies & Children's Hospital; ⁹Ann and Robert H. Lurie Children's Hospital of Chicago; ¹⁰Stanford University School of Medicine; ¹¹NYU; ¹²T1D Exchange; University of Mississippi; ¹³University of Colorado Denver - Anschutz Medical Campus, Barbara Davis Center; ¹⁴Cincinnati Children's Hospital Medical Center15Michigan Medicine, Pediatric Endocrinology and Susan B. Meister Child Health Evaluation and Research Center







Disclosures

Dr. Joyce Lee is on the GoodRx medical advisory board and a consultant for Tandem Diabetes Care.

Dr Osagie Ebekozien is an advisor for Medtronic Diabetes and Sanofi Diabetes. He has received research support through his institution (T1D Exchange) from Abbott, Vertex, Eli Lilly, Dexcom and Medtronic.

Dr. Risa Wolf receives research support through her institution (Johns Hopkins) from Novo Nordisk as the center PI of a trial.





Design Matters!

Background

- Optimal Design of the EHR is critical to the quality and reliability of data captured to improve care and outcomes.
- We described EHR tools, workflows and data elements which contribute to core quality metrics in the TIDX-QI.











Methods

- Interview conducted over Zoom with QI representatives at thirteen T1DX-QI centers about their EHR tools and clinic workflows.
- Centers shared screenshots of EHR tools/interfaces used to capture and contribute to 17 data elements.

Insulin Delivery Data	
Daily Carbs entered into device	230
Patient Weight in kg	85
TDD/kg	1.2
Ketone dose	4
Diabetes Interval History	
Date of last diabetes visit	9/27/2022
Attended Clinic With	Mother
Associated Complications	none
# of DKA events (pH <7.3 or HCO3 <15)	0
number of school days missed since last	0
Number of times BG data was download	0
Number of times insulin was adjusted by	0
Timing of Insulin with meals	Immediately before the meal
Pump site/ injection locations	Arms; Abdomen; Thighs
PHQ-9 Score	
If abn PHQ-9, has patient been refer for	
Interval History	
Self Management Behaviors	
Pt/Caregiver knows when to check for ke	yes
Pt/caregiver knows how to manage exer	yes
HYPOGLYCEMIA	
Experiencing Blood Glucose <50	No
Experiencing Nocturnal Hypoglycemia	Yes
Threshold at which child feels symptoms	60-69 mg/dl
Symptoms experienced by child when low	Dizziness; Sweating
Number of times child had severe hypogl	
Pt/caregiver has glucagon and knows ho	yes
Patient/caregiver knows how to treat a lo	yes



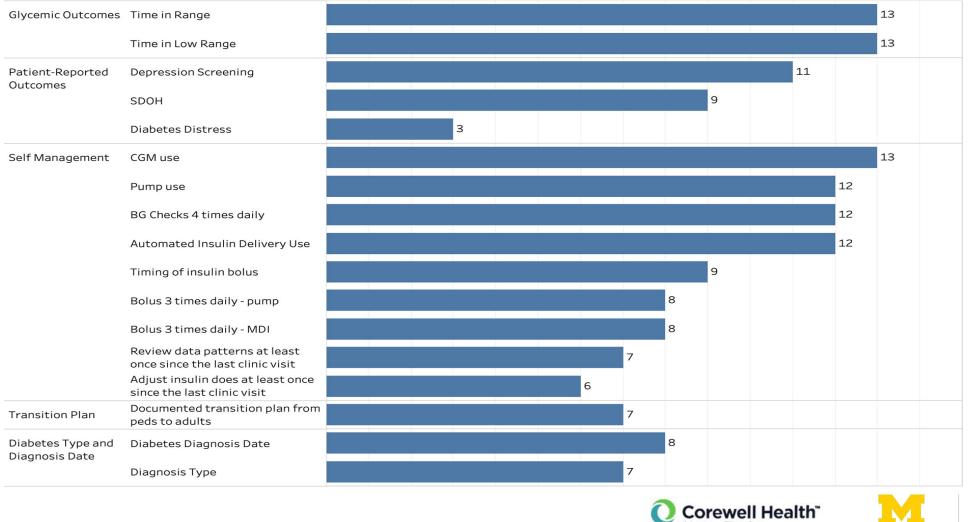


- 12 pediatric and 1 adult center
- All centers used structured data tools
- 10 using EPIC, 3 using Cerner
- Metrics per center ranged from 4 to 17 at each site









Helen DeVos

Children's Hospital

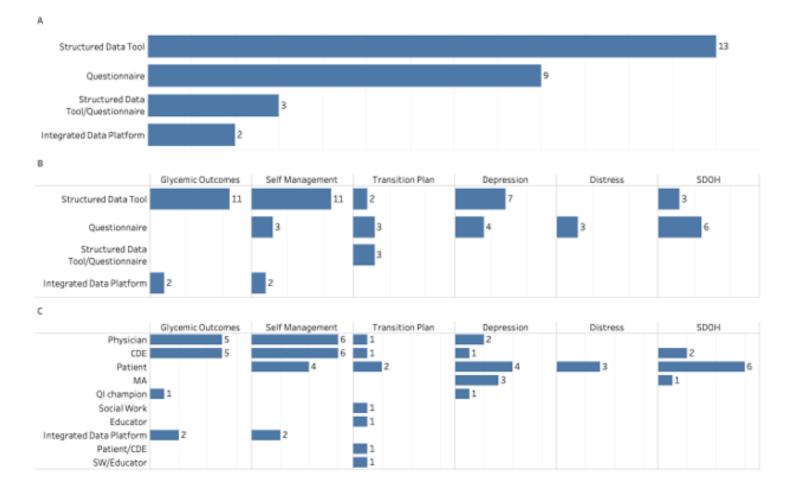


	Are you surrantly using a COMO (Ves
CGM	 Are you currently using a CGM? (Yes, No)* Which CGM are you using? (Brands)*
 Is the patient using and wearing a continuous glucose monitor (Yes, No) Days worn in the past 14 days (Numeric) 	 % of time CGM used per 2 weeks (Numeric)
	CGM Brand (Brands)
	Continuous Glucose Monitor Device (Brands)
 Uses CGM (Yes, No) CGM Type (Brands) 	 Number of days (Numeric) % of time CGM active (Numeric)
 Wears CGM>70% of the time (Yes, No) % Wear time 	 CGM Brand (Brands) Start Date of CGM (Date)
 CGM Model (Brands) Days with CGM data (out of 14) (Numeric) % Time CGM is active 	 Days with CGM data (typically out of 14) (Numeric) How does your child usually do blood
 Does Patient Have a CGM? (Does Not Have CGM, CGM Brands) CGM Use in the last 14 days (CGM Use- 	sugar checks? (Finger stick and glucose meter, CGM, Both meter and CGM, Don't check blood sugars)*
10-14 days; CGM Use-1-9 days; No CGM Use-0 days)	 Do you use CGM (Never used, Intermittent/used in past, Regular/currently in use) Name of CGM Manufacturer (Brands) % time CGM worn/active (Numeric)





U-M Pediatric Diabetes









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			EHR Tools	•		Individual who Inputs Data					
Data Site Elements	Automated Data Tools	Structured Data Tool	Questionnaire	Clinic Workflow	DCES /Nurse	нср	Patient	Social Work	QI champion	Data Capture Frequency	
А	17	-	-	-	Paired	-		-			Each Visit
в	17		-	•	Paired	-		-			Each Visit
с	15		-	•	Paired	-	•	-			Each Visit
D	16		-	•	Paired	-		-			Each Visit
Е	14		-	•	HCP only	•		-		•	Each Visit
F	15		-		Paired		•		•		Each Visit
G	10		-	•	Paired	•	•	-			Each Visit
н	10		-	•	HCP only		•	-			Each Visit
I.	12		-	•	Paired	-		-			Each Visit
J	12	•	-	•	Paired		•				Each Visit
к	8		•		HCP only		•			•	Each Visit
L	6		-		HCP only		•				Each Visit
м	4		-		HCP only	-					At Education Visits

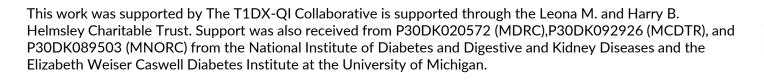
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Conclusions

- Systematic and comprehensive data acquisition from the EHR is critical for quality improvement.
- Current design of metric specification, tool design, and integration into workflows lacks standardization and poses barriers for provider adoption and data availability.
- Further work is needed to address standardization in EHR data elements, tools and workflows

Limitations

- Convenience sample of centers in the T1DX-QI skewed to those with more Health IT capacity
- Did not do video capture or electronic capture of workflows screenshots
- Did not evaluate data quality but focused on data availability at centers.









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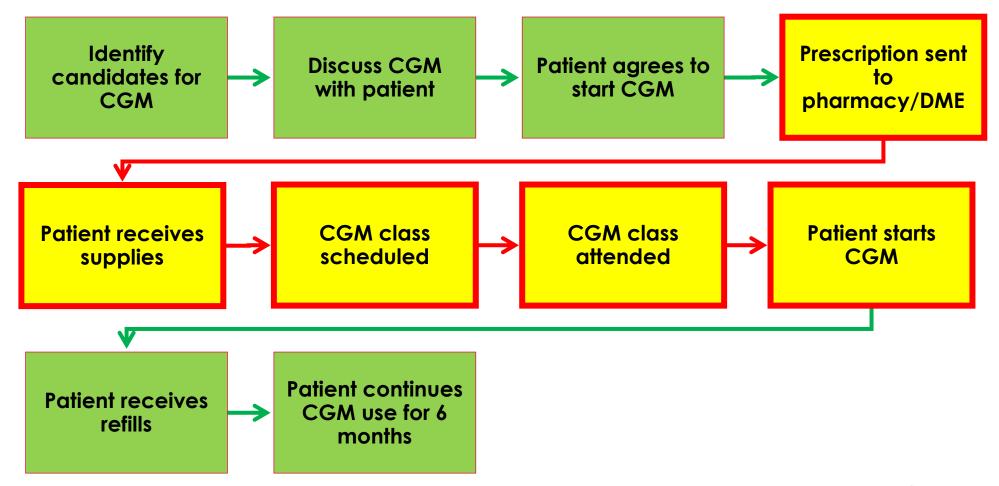
Developing a Tracking Tool for Continuous Glucose Monitor Prescriptions Among Children and Young Adults with Type 1 & Type 2 Diabetes

Amanda Perkins, CPNP, CDCES, MPH; Mai Tran, PharmD; Jody Grundman, MD, MPH; Sarah Lydia Holly, RN, BSN; Jennifer Reilly, RD, CDCES; Nina Verma, RRT; Shideh Majidi, MD, MSCS

Background

- Rates of Continuous Glucose Monitor (CGM) uptake remain suboptimal despite evidence that CGM use improves diabetes control and disparities exist
- Successful CGM uptake requires a multi-disciplinary team of prescribers, pharmacists, diabetes educators and administrative staff
- Inability to track new CGM prescriptions through initiation, fulfillment and patient education were identified in a fishbone diagram as barriers to uptake
- Change idea: Ability to track the process as a strategy to increase uptake

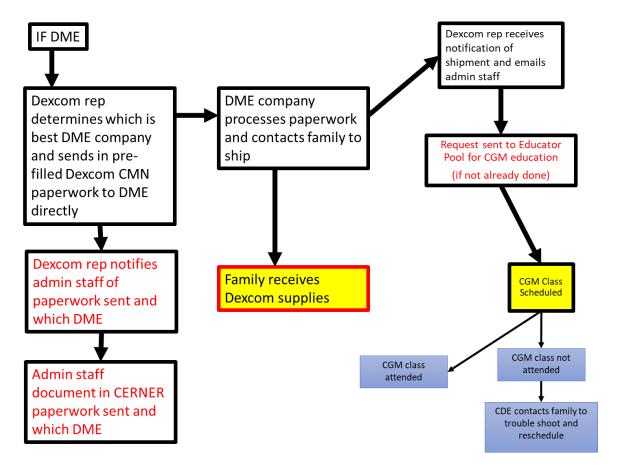
CGM Process Map: How it started



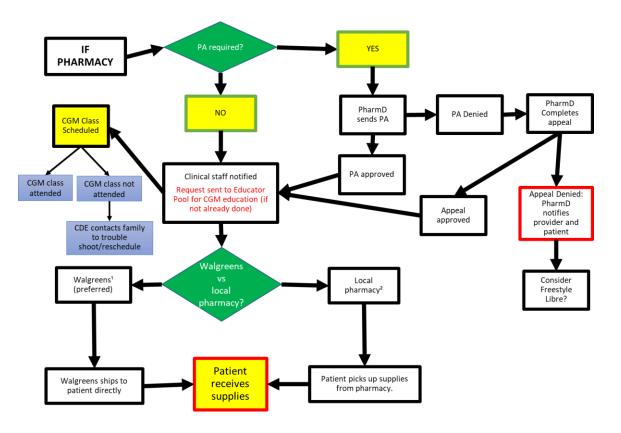
Children's National.

CGM Process Map: How it's going

Map for patients using DME



Map for patients with pharmacy benefit



Children's National.

General Information	General Infor	mation					
Education Phamacy Benefit	Date Request Initiated	Contact Information If	Preferred Language	Тур	e of CGM Requested		
DME Benefit	<u>xx /xx /xxxx</u>		O English O Spanish O Other:	typ	enter free-text, start ing in combo box ove	Po	CGM Werform
	Comments				Receiver Needed		
					O Yes O No	V	V N
	Contact Information						
	Primary Guarantor Info			^			
	Primary Care Provider Info	<u>0</u>		*			
	Insurance Information				Pharmacy Benefit Information		
	No Data Available						Children's National.

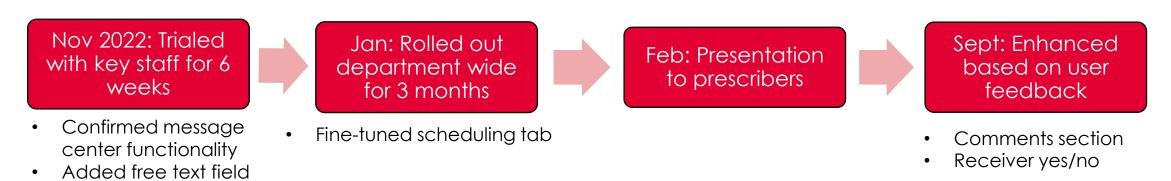
				Powerform	
* General Informatio	Education				
Education Phamacy Benefit DME Benefit	Date CGM Education Requested	Date CGM Class Scheduled	Date CGM Class Attended	If CGM Class Not Attended, Follow-up Call To Family Done On:	~
	Send education request to educator pool with subject line "CGM Education Request"				
	Notes - CGM Class Not Attended				



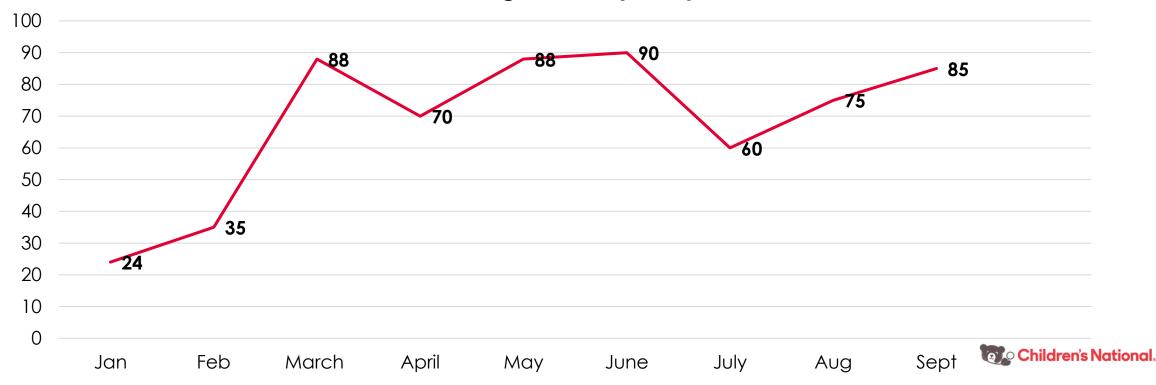
	DME Benefit					
Education						
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PDSA Cycles and Usage



CGM Powerform Usage January – September 2023



Lessons learned

- Have a unified process and define it
- Multidisciplinary involvement is key

Next steps

- Extracted data from the CGM Powerform will identify areas for further process improvement and disparities in the process
- The QI team plans to implement a similar form to track insulin pump initiation

Conclusion

 An EMR embedded Powerform is a feasible and acceptable way for a multi-disciplinary team to track new CGM prescriptions through initiation, fulfillment and patient education and allows for a multi-disciplinary team to follow progress

