



# Increasing CGM Utilization in Pediatric T1D Patients with Hemoglobin A1c Values $\geq 8.5\%$

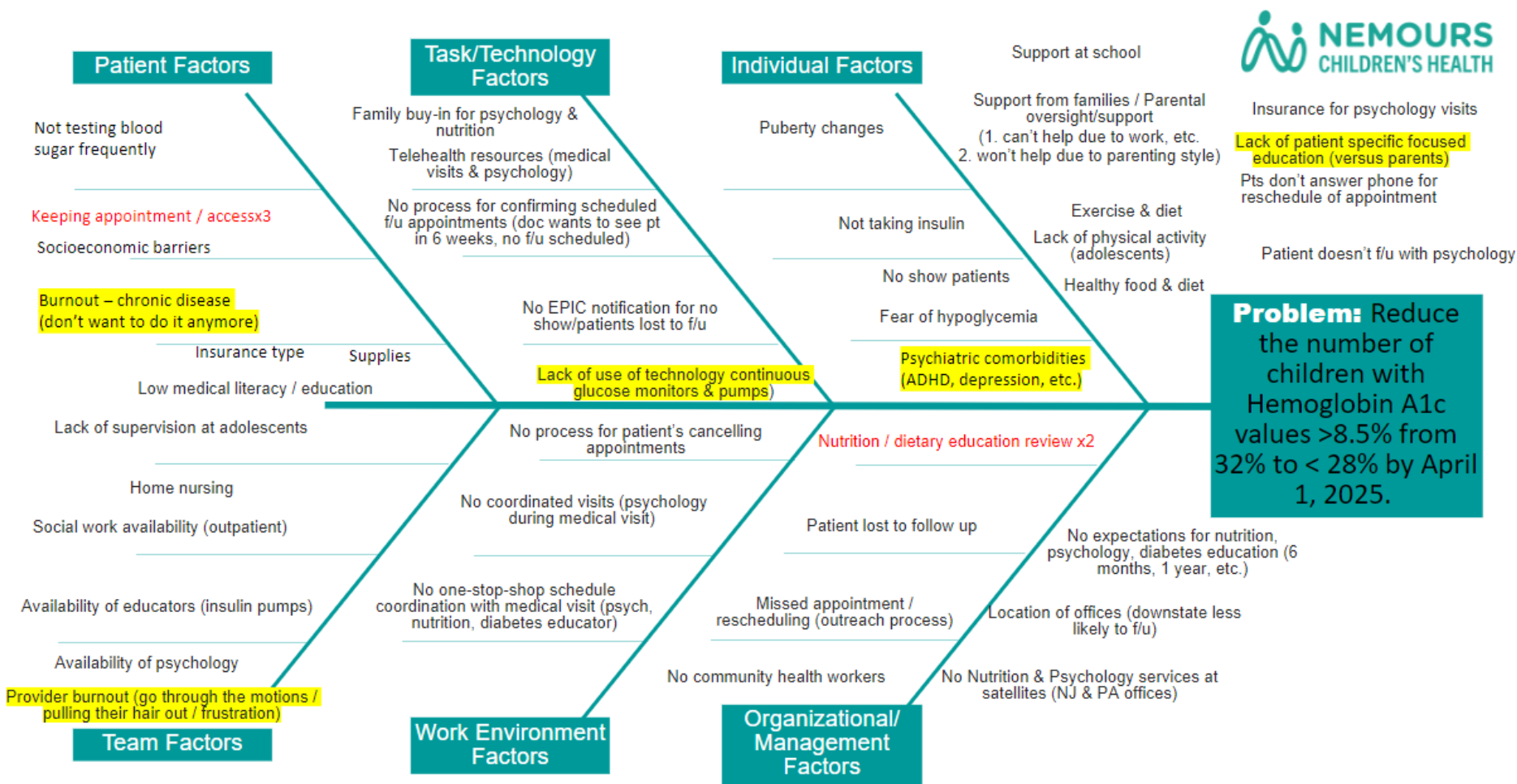
Patrick Hanley, MD, MSHQS

November 11<sup>th</sup>, 2024

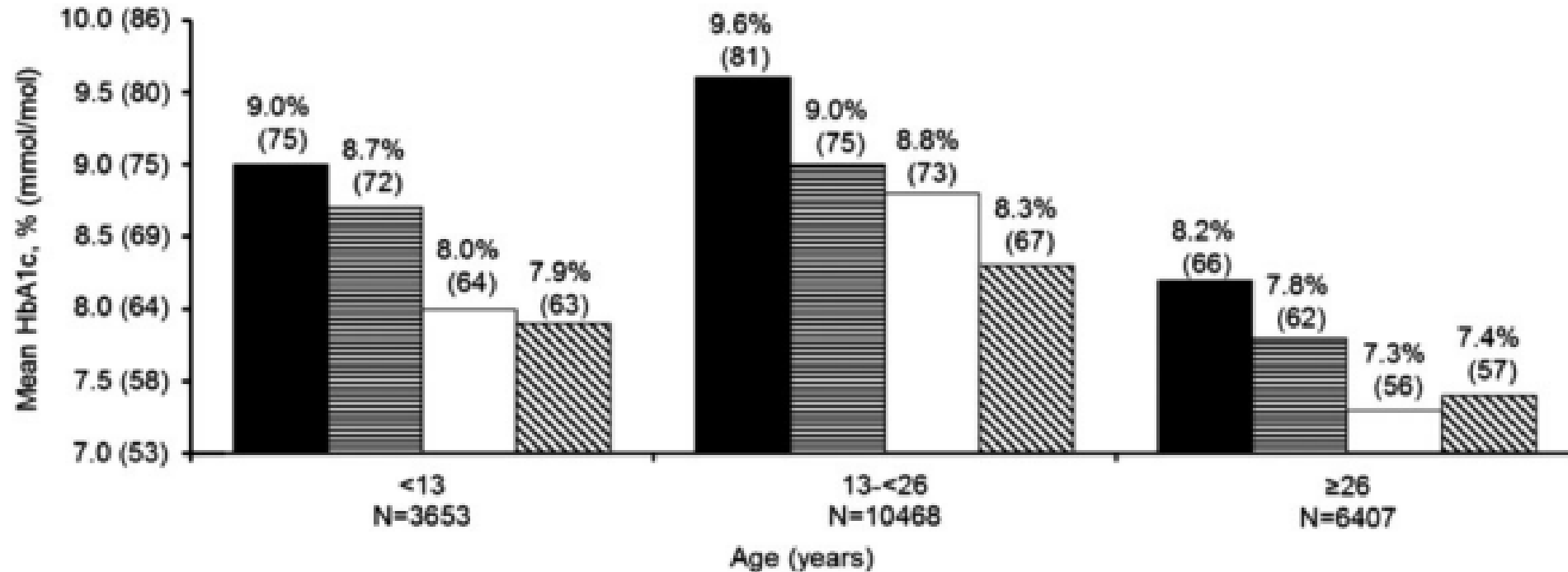


**NEMOURS**  
CHILDREN'S HEALTH

# Background for Continuous Glucose Monitor (CGM) Project



# Impact of Technology on HbA1c in T1D



**FIG. 3.** Mean HbA1c by technology use in 2016–2018. Solid black represents injection only. Horizontal stripes represent pump only. Solid white represents injection+CGM. Diagonal stripes represent pump+CGM.

# Baseline Data for CGM Utilization

<u>CGM Prescribed</u>	<u>A1c &gt; 8.5% (N=322)</u>	<u>Percent of Total</u>	<u>A1c &lt; 8.5% (N=752)</u>	<u>Percent of Total</u>
Yes	283	<b>88%</b>	703	<b>93%</b>
No	35	<b>11%</b>	38	<b>5%</b>
<i>Not documented</i>	4	<b>1%</b>	11	<b>2%</b>
<u>CGM Used Reliably</u>	<u>A1c &gt; 8.5% (N=322)</u>	<u>Percent of Total</u>	<u>A1c &lt; 8.5% (N=752)</u>	<u>Percent of Total</u>
Yes	179	<b>56%</b>	615	<b>82%</b>
No	104	<b>32%</b>	48	<b>6%</b>
<i>Not documented</i>	39	<b>12%</b>	89	<b>12%</b>

# Project AIMS

- Investigate reasons for decreased CGM utilization.
- Increase CGM utilization in patients with HbA1c  $\geq 8.5\%$  by 10% by July 2025.

# Interventions in CGM Utilization Project

Core team: Diabetes NP, QI Specialist, 2 Endocrinologists, Medical Student.

## **Changes implemented:**

- Patient questionnaire
- Standardized the definition for documenting using CGM reliably
- Created and distributed a CGM tipsheet
- Added automatic billing to documenting CGM usage in SmartForm
- Collected feedback on CGM tipsheet

# Patient Questionnaire (n=25)

## Continuous Glucose Monitor Questionnaire:

As you know, diabetes can be challenging, and one tool that can help some people with their diabetes is using a continuous glucose monitor (CGM) such as a Dexcom, Libre, or Medtronic sensor.

However, despite the benefits, sometimes patients don't wear CGMs, and we want to learn more about why. We want you to have the best diabetes care, and CGM can be an important part of that, so we hope you can help us by answering the two questions below.

- 1) Can you please tell us the reasons you are not using a continuous glucose monitor or if you are prescribed one, what prevents you from wearing it?

- 2) What can we do to better support you using a continuous glucose monitor?

# Standardize “Reliably” for CGM Use

Open Diabetes LHS

DIABETES SUMMARY FORM

- Diabetes Summary
- Annual Laborator...
- Immunization Rpt
- Quarterly Labora...
- CGM Time in Ra...
- Depression Scrn
- Depression Flwsht

PEDSQL DIABETES

- PedsQL Diab Scrn
- PedsQL Flwsht

## Diabetes Summary

Expand All Collapse All

Date of DM Visit Review  
10/17/2024

### Background Information

#### Technology

Does patient have access to continuous glucose monitor?

Does the patient reliably use the continuous glucose monitoring system?

Was the continuous glucose monitoring data reviewed during visit

Percent Time in Range (TIR)

Glucose Monitor Table

	Type	Start Date	Stop Date
1	Dexcom		
2	<input type="text"/>	<input type="text"/>	<input type="text"/>



# CGM Tipsheet



## Tips for Wearing a Continuous Glucose Monitor (CGM)

If your continuous glucose monitor falls off sometimes, try these things to keep it in place. Find out how to handle other problems too.

### Basic Tips

- Try placing your CGM on different parts of the body. Ask your provider for suggestions.
- Clean your skin of oils and lotions. Wash the site using a non-moisturizing soap like Dial®.
- After you insert the sensor, rub the dressing around the sensor to attach it securely.
- Use an overlay patch to hold your sensor in place.



Dexcom



Libre

### How to Hold Your CGM in Place?

Try using a skin adhesive and a clear film dressing to help your CGM stay secure.

First, use a skin adhesive (like Skin Tac™ or Mastisol®)

Follow these steps:

1. Wipe the Skin Tac or Mastisol in a donut shape at the insertion site. Let the adhesive product dry completely.
2. Insert the CGM sensor.
3. Wipe the tape, including edges, with the Mastisol or Skin Tac again. Let it dry completely.
4. When it is dry, place the overlay patch on top.
5. At any time during the week, if the edges of the dressing come loose, wipe the edges with more Skin Tac or Mastisol.



### How to Remove Your CGM?

If you have trouble removing the dressing before removing your CGM, try using TacAway® adhesive remover wipes or baby oil. Gradually rub at the outside edge of the tape and skin while slowly pulling the tape. Continue working inward until you reach the final edge of the adhesive, and the sensor comes off easily.

### How to Avoid Irritated or Sensitive skin caused by the Sensor Adhesive?

Scan the QR code to read what to do.



### Where to Buy Overlay Patches and Skin Adhesives?

You can buy overlay patches, skin adhesives, and adhesive remover wipes online or at a local retail store. Try Amazon, Walmart etc.

### What to Do If Your Sensor Falls Off?

If your sensor falls off, contact your CGM company to get a replacement.

You can contact the company by going to their website and using the chat, reaching out to them on their app, or calling their support line.

For the Libre support line, call (855) 632-8658 or scan the QR code. For the Dexcom support line, call (844) 607-8398 or scan the QR code.



Libre



Dexcom

### When to Contact Your CGM Company?

Call the company that makes your CGM if:

- Your sensor falls off too soon. The company will send you a replacement at no cost to you.
- You have a technical problem. (like a sensor error or you cannot connect your CGM to your phone.)
- When inserting your sensor, you have a lot of bleeding at the site and need a replacement sensor.

### When to Contact Your Diabetes Care Team?

# Added Billing to CGM Documentation in Diabetes SmartForm

Open Diabetes LHS

DIABETES SUMMARY FORM

- Diabetes Summary
- Annual Laborator...
- Immunization Rpt
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- CGM Time in Ra...
- Depression Scrn
- Depression Flwsht

PedsQL DIABETES

- PedsQL Diab Scrn
- PedsQL Flwsht

**Diabetes Summary**

Expand All Collapse All

Date of DM Visit Review  
10/17/2024

> **Background Information**

Technology

Does patient have access to continuous glucose monitor?  
Yes No

Does the patient reliably use the continuous glucose monitoring system?  
Yes No

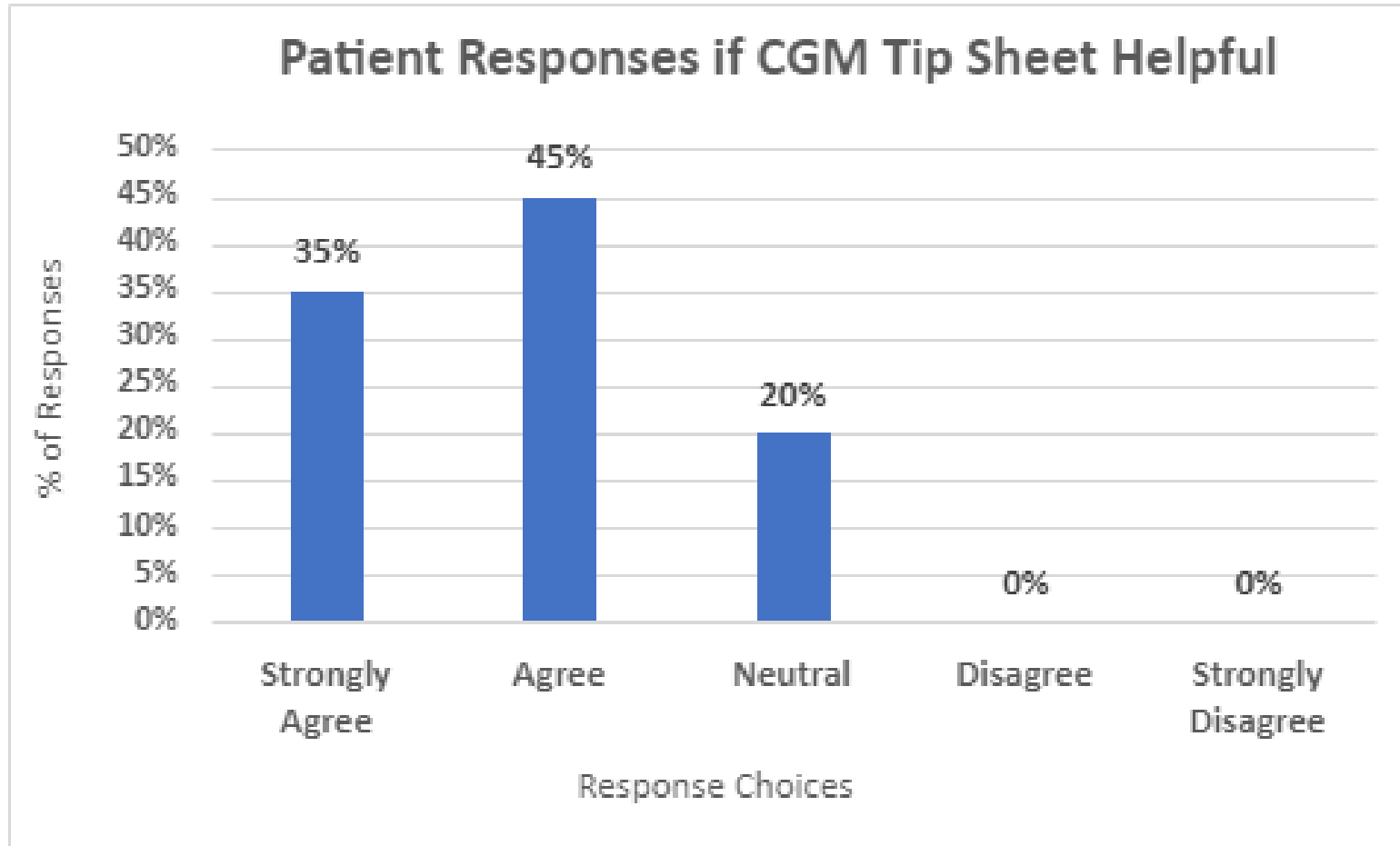
Was the continuous glucose monitoring data reviewed during visit?  
Yes No

## Charge Capture Charges

Charge ID	Procedure Code	Description	Qty.	Modifiers	Charge Entry User	Diagnosis
103608238	99215	OFFICE/OUTPATIENT ESTABLISHED HIGH MDM 40-54 MIN	1	25	Hanley, Patrick, MD	Type 1 diabetes mellitus with hyperglycemia
103608614	95251	CONT GLUCOSE MONIT 72 HR PHYS INTERP	1		Hanley, Patrick, MD	Type 1 diabetes mellitus with hyperglycemia

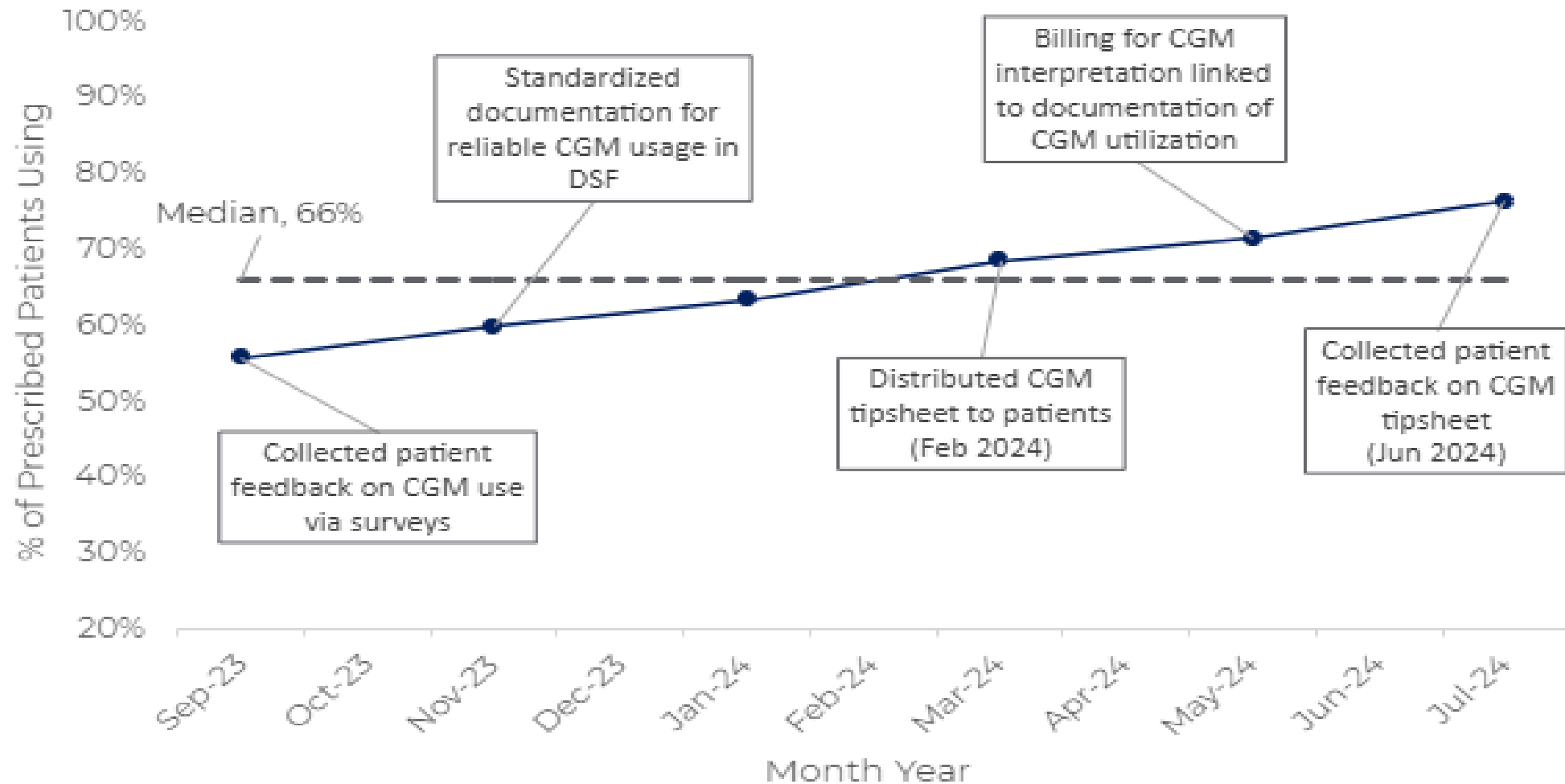


# Follow Up Survey (n=60)



5) What can we do to better support you using a continuous glucose monitor?

## % of Patients Using CGM Regularly & A1C > 8.5



# Conclusions

- Baseline: **56% of patients** with HbA1c  $\geq 8.5\%$  used CGM reliably compared to **82% in patients** with HbA1c  $< 8.5\%$ .
- The initial survey (n=25) responses **centered around challenges with CGM skin adherence**. Follow-up survey responses (n=60) indicated **80% of patients found the tipsheet helpful**.
- This project used patient feedback, a tipsheet, and enhancements in the Diabetes SmartForm documentation.
- Project interventions increased reliable utilization and documentation of CGM use in patients **with T1D and HbA1c  $\geq 8.5\%$  from 56% to 76%**.

# Lessons and Challenges

## Lessons Learned:

- The survey was effective in helping understand why CGM were not utilized.
- Providing a tipsheet was valuable to patients already using their CGM reliably.
- Reengaging patients that previously were not interested in technology was helpful.

## Challenges:

- Challenging to get patients to fill out the initial surveys.
- Access for patients to CGMs due to insurance or other financial barriers.
- Technology literacy and a lack of trust in technology.

Thank you for your time – questions or feedback?



[Patrick.Hanley@nemours.org](mailto:Patrick.Hanley@nemours.org)



# Standardizing Insulin Pump Back-Up Plans

Kai E. Jones, Sister Grace Miriam Usala, Alyssa Carvalho,  
Doriann Klaassen, Cynthia J. Herrick, Natalia Genere

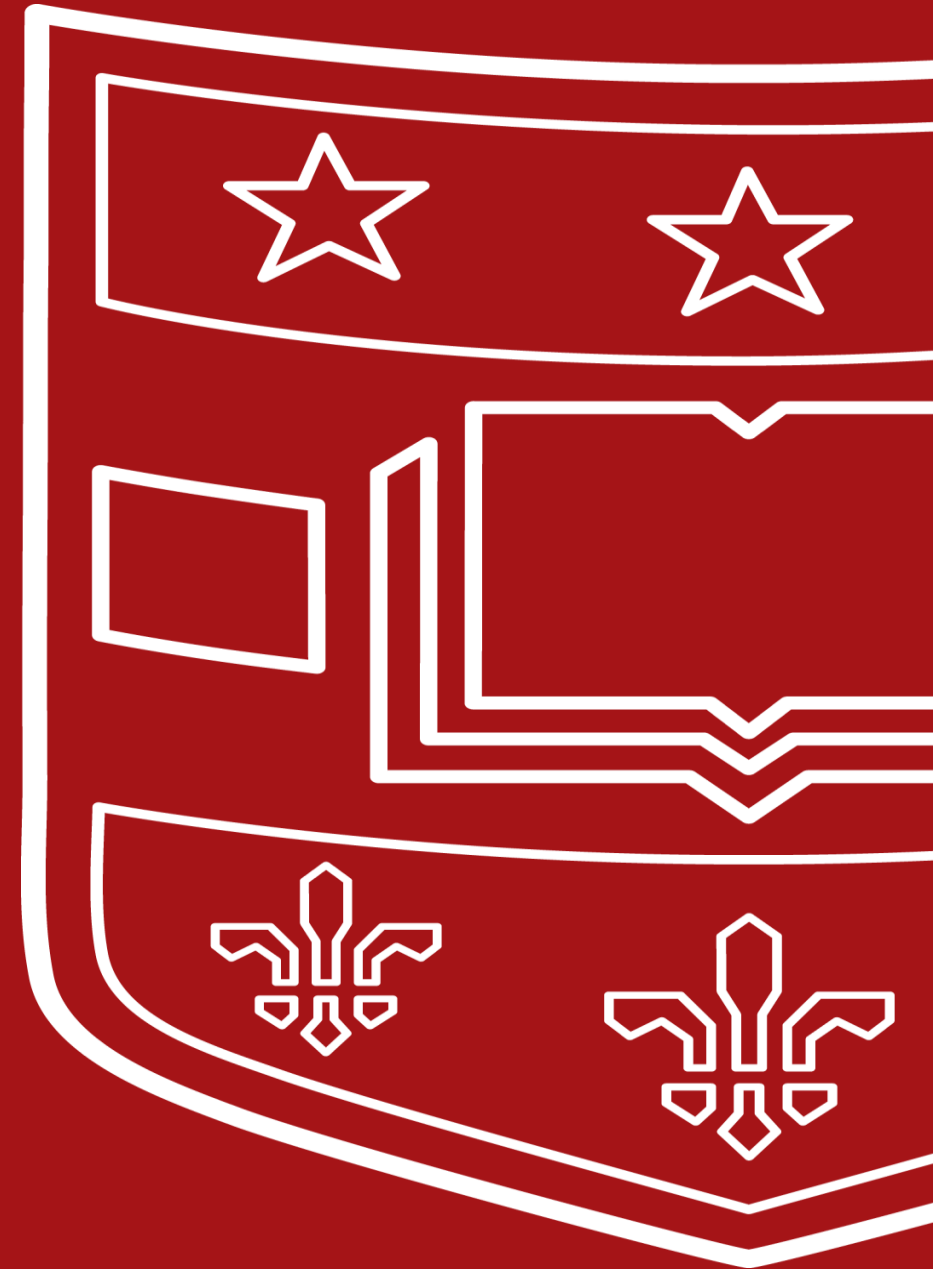
Washington University School of Medicine





# Disclosures

Nothing to disclose



# Background



Insulin pump therapy has revolutionized T1D management but increases the risk of diabetic ketoacidosis.



To mitigate ketoacidosis, professional societies recommend insulin pump failure plans.

# Background



We noticed a high rate of calls after hours with pump issues



We instituted a quality improvement project to (1) standardize documentation and (2) evaluate patients' confidence in their personalized back-up plan.

# Background



A retrospective review determined frequency of patients having the necessary components of pump back-up plan WIS



(1) **Written** back-up plan with dosing, (2) intermediate or long-acting **Insulin** prescription, and (3) appropriate injection **Supplies**.

# Background



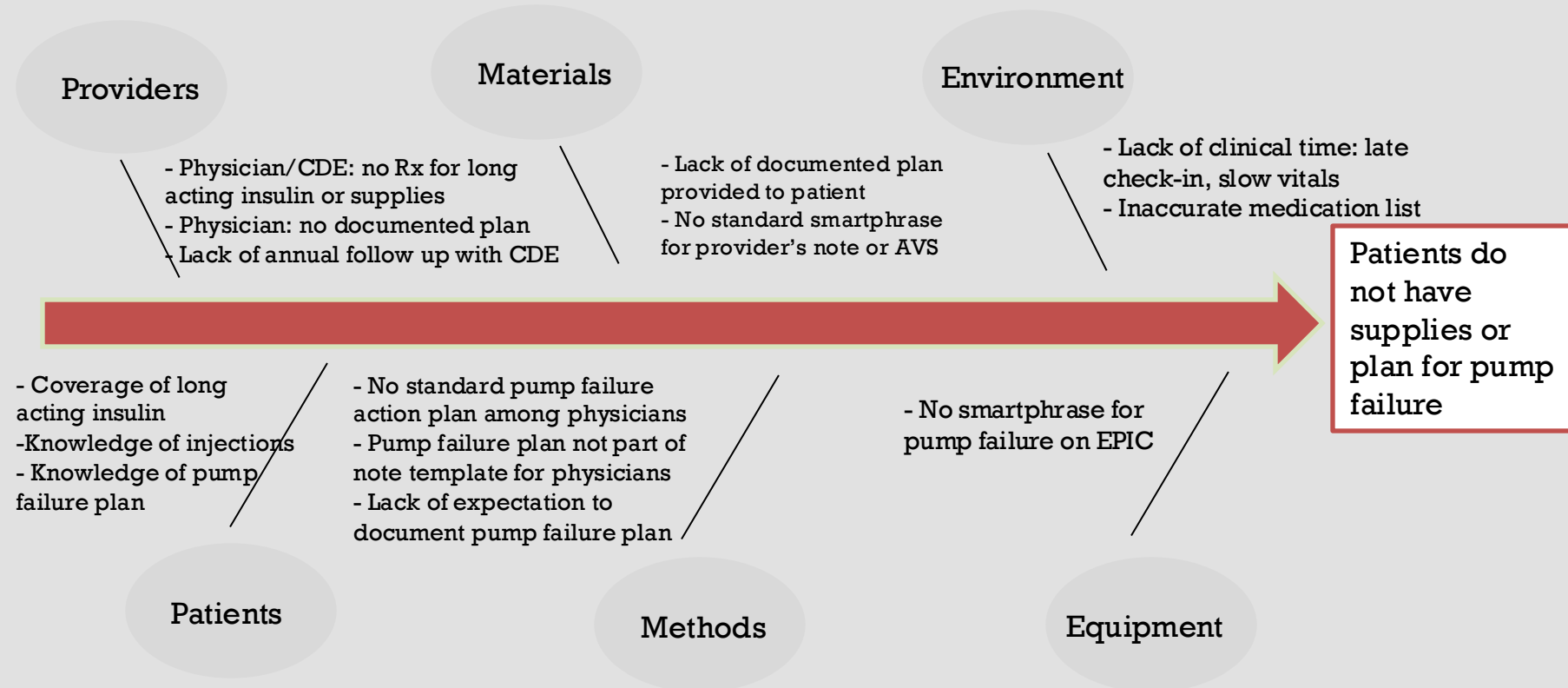
- Retrospective examination of charts of insulin pump users (N = 90)
- **39%** had a CDE visit in the last year
- **56%** have no active prescription for needles/syringes
- **52 %** have no documented plan (last year)
- **66%** have no active basal insulin prescription
- Only **33%** have all components of a successful pump failure back up plan

# Background



- 20 patients were surveyed
- Frequency of Pump Failure (last 3rs) : 0.97
- Pump Failure Plan knowledge: Yes (94%)
- Pump failure written plan: Yes (53%)
- Confidence: Confident (57%)

# Why does the current gap exist





Increase documentation of a pump failure plan and insulin prescriptions and supplies by **50% in the next 12 months** in adult patients with type 1 and type 2 diabetes treated with an insulin pump, followed at the outpatient Washington University Diabetes Center to promote successful insulin pump management.



# Stakeholders – MD Providers



- How often do you discuss insulin pump backup plans?

Every visit	45.45%
Annually	13.64%
Sporadically	40.91%
Not discussing	0.00%
Defer to certified diabetes educator (CDE)	0.00%
Total	22

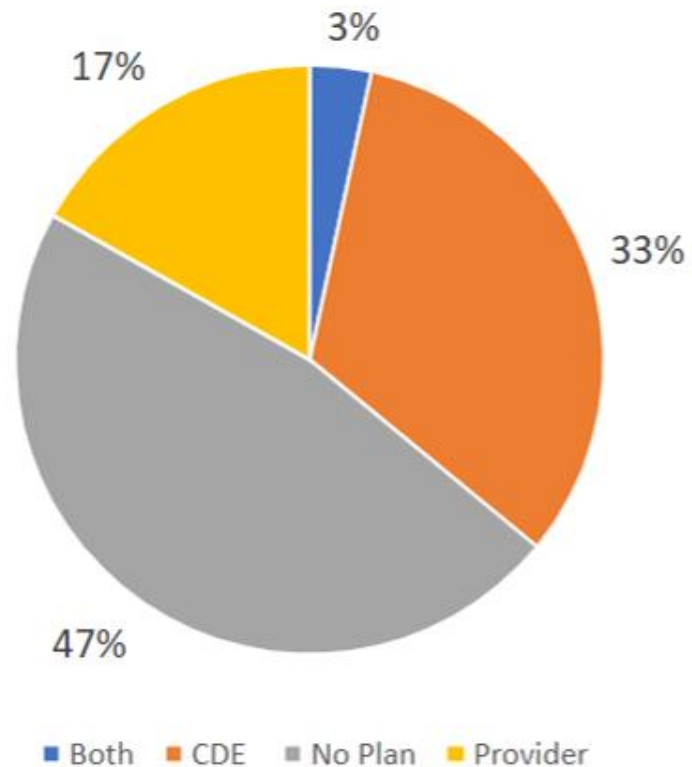


# Stakeholders – MD Providers

- What would be the most helpful for more of your patients to get insulin pump back up plans?

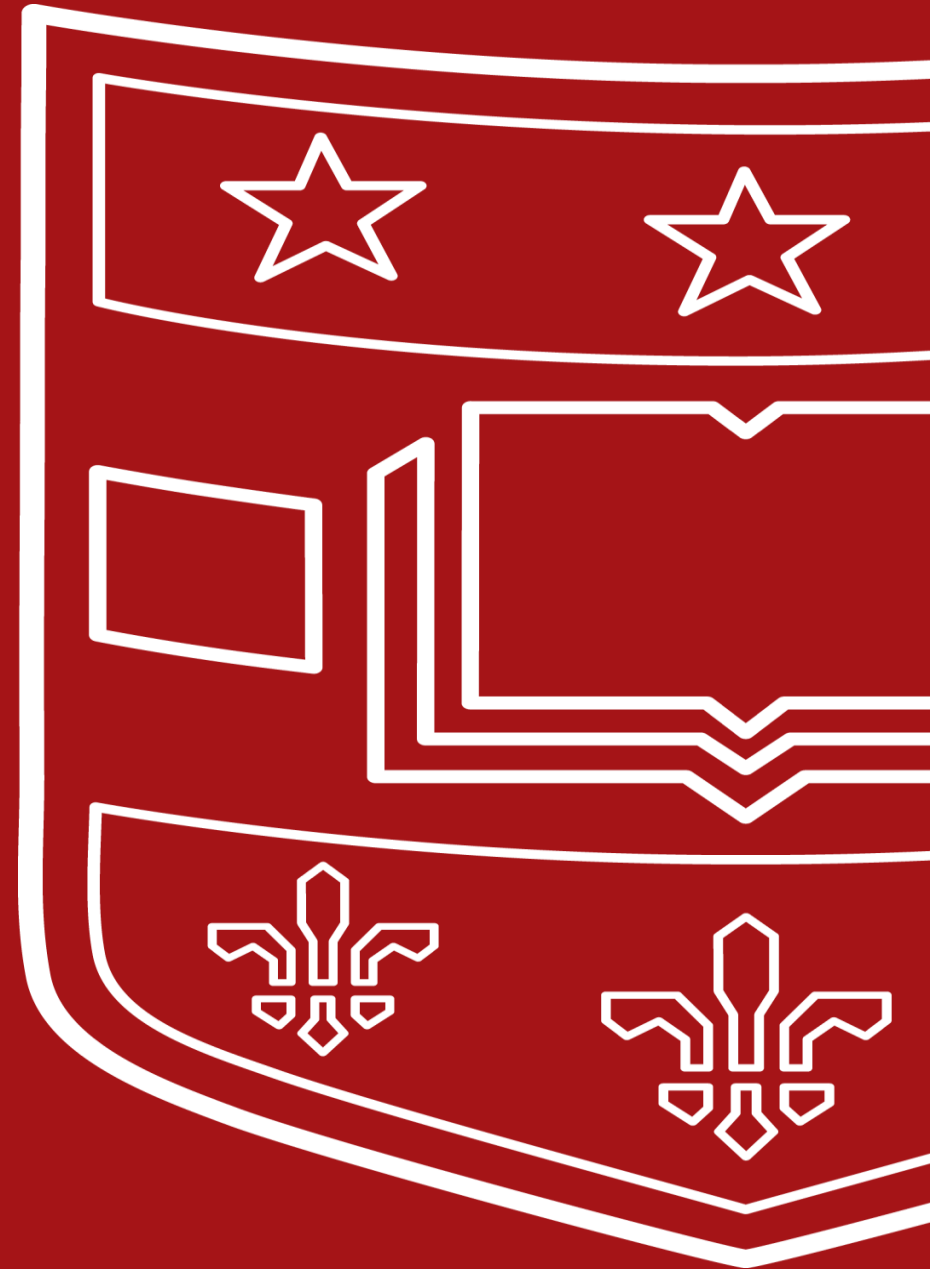
Standardized insulin pump backup template	86.36%	19
Reminder for me to review backup plan	36.36%	8
Reminder to refer to CDE for review	31.82%	7
Pump backup plan informational video for patients	40.91%	9
Other (please give us ideas!)	22.73%	5
Total		22 (could select multiple)

# Who is documenting a back-up plan?



- CDCES involvement in care was associated with a higher likelihood of successful WIS components (53.3% vs. 11.4%,  $p < 0.001$ )
- However, only 39% of patients had a CDECES visit within the year




# Interventions



# Interventions



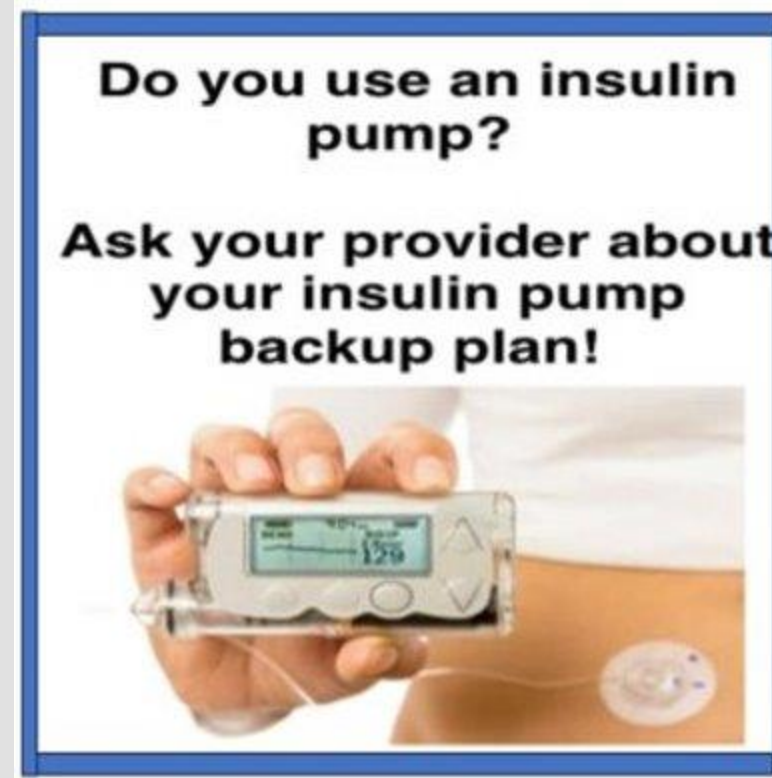
- ❑ Creating a **SMART phrase.**

Green Zone: Well					
<p>Glucose is in expected range. Pump working normally</p>	 <p>Continue your current pump settings</p>				
Yellow Zone: Watch Out!					
<p>If Glucose on your finger stick or CGM is higher than expected and you suspect pump failure begin to troubleshoot your system.</p>	 <p><b>Check for common causes of pump failure</b></p> <ul style="list-style-type: none"> <li>- Out of insulin --&gt; new insulin</li> <li>- Expired insulin or insulin that went bad due to heat or freezing --&gt; new insulin</li> <li>- Connection issue - insertion site is dislodged/loose/kinked, tubing obstruction, cracks in tubing, loose connection --&gt; change your site!</li> <li>- Site issue - site irritation, infection, scarring --&gt; change your site!</li> </ul> <p><b>When in doubt, change it out!</b> Follow your hyperglycemia protocol to determine if extra insulin doses are required.</p>				
Red Zone: EMERGENCY!					
<p>If your Glucose remains persistently high, your pump appears to have stopped working.</p> <p>Use the following approximate doses for diabetes care until your pump is back to working normally.</p> <p><b>RAPID Acting Insulins include:</b> Humalog, Novolog, Apidra, Admelog, Lyumjev.</p> <p><b>LONG Acting insulins:</b> Lantus, Basaglar, Semglee, Tresiba, Toujeo, Levemir.</p>	 <p>- Start A Back Up Plan!</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Basal Rate Substitute</th> <th style="width: 40%;">Insulin to Carb Ratio + Correction Factor or Sliding Scale</th> </tr> </thead> <tbody> <tr> <td> <p><b>Option 1 (short-term off pump)</b> Inject RAPID acting insulin - ***units every 4 hours until pump restarted.</p> <p><b>Option 2 (&gt;12 hours off pump)</b> Inject LONG acting insulin - ***units every 24 hours</p> <p><b>Option 3 (if you have no insulin accessible)</b> Walmart stores have NPH insulin which can be bought over the counter without a prescription. To use this option, you will need to look at the number of units in option 2 and divide this in half. You will take this dose of NPH every 12 hours. Inject NPH *** (1/2 of 'option 2') units every 12 hours</p> </td> <td style="vertical-align: top;"> <p>1 unit for every ***g of carbs</p> <p style="text-align: center;">+</p> <p>(Correction Scales 48962)</p> </td> </tr> </tbody> </table>	Basal Rate Substitute	Insulin to Carb Ratio + Correction Factor or Sliding Scale	<p><b>Option 1 (short-term off pump)</b> Inject RAPID acting insulin - ***units every 4 hours until pump restarted.</p> <p><b>Option 2 (&gt;12 hours off pump)</b> Inject LONG acting insulin - ***units every 24 hours</p> <p><b>Option 3 (if you have no insulin accessible)</b> Walmart stores have NPH insulin which can be bought over the counter without a prescription. To use this option, you will need to look at the number of units in option 2 and divide this in half. You will take this dose of NPH every 12 hours. Inject NPH *** (1/2 of 'option 2') units every 12 hours</p>	<p>1 unit for every ***g of carbs</p> <p style="text-align: center;">+</p> <p>(Correction Scales 48962)</p>
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# Interventions



- We created **fliers** to increase awareness among clinicians and patients for the need for insulin pump back-up plans and distributed them to all clinic exam rooms.



# Interventions

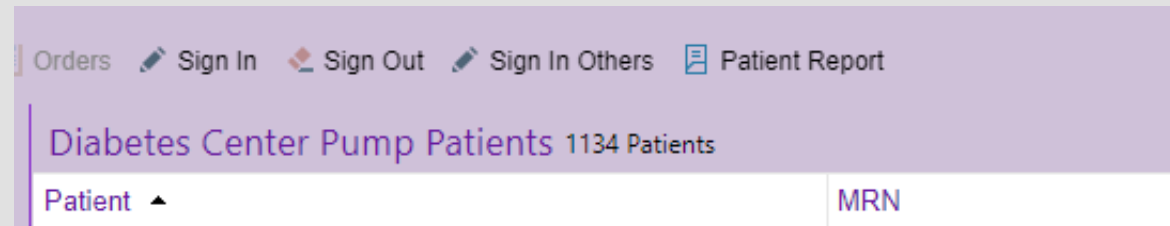


- Diabetes Technology Clinic** with MD provider (Dr. Williams) and CDE (Barb Klingler, RN)
- Marketed as a "Tech Tune Up"

# Interventions



- ❑ Collaborating with our **EMR developers** to create an insulin pump “problem” for easier identification of pump users.





# Aspirational Checklist



## Healthcare Maintenance

- Annual lipids, TSH, CMP, CBC, UACR, Ophthalmology for retina exam
- Celiac screen once and/or when symptoms
- HbA1c Q3 months
- Foot exam
- Vaccinations
- Periodic check of Vit B12, 25OHD
- Age 50+ annually: SARC-F screen for sarcopenia
- Routine DXA per guidelines
- Driving safety

## Surveys

- Hypoglycemia Fear Survey-II Q6 months
- Diabetes Distress Scale survey
- Rapid cognitive screen for MCI
- Social determinants of health

## Supplies - refills for 6 months at every visit

- Refills of insulin vials
- Refill of CGM
- Refill of insulin pump supplies
- Back-up syringes
- Back-up basal insulin, if pen, then also pen needles
- Back-up glucometer, test strips, lancets
- Glucagon
- Urine ketone strips or blood ketone meter and supplies

## Evaluation and Management

- Insulin titration
- Sick day rules/ketones
- Site or infusion failure
- Temp basal rates
- Pump holiday
- Pregnancy planning or prevention
- Site rotation and any issues, allergies to glue or adhesives
- Insulin storage issues
- Management during exercise, sleep, EtOH intake
- Treatment of hypoglycemia
- Treatment of hyperglycemia
- Insulin bolus stacking

## Education/Training

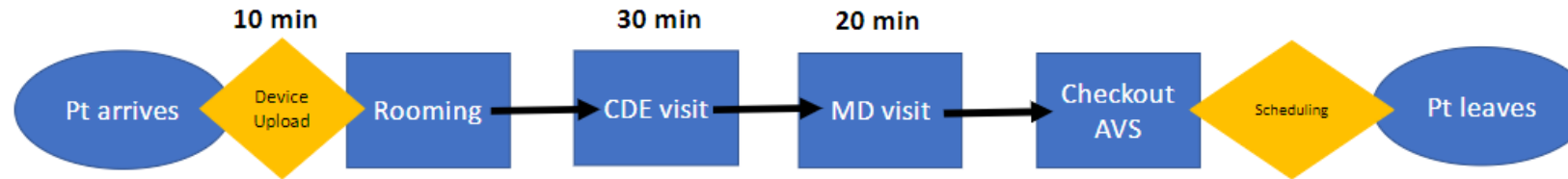
- General diabetes management
- Carbohydrate counting
- CGM: insertion of sensors, replacing sensors, how to troubleshoot sensor failures
- CSII: alternating pump insertion sites, replacing infusion sets, how to troubleshoot pump occlusions, recognizing infusion set failures, pre-meal bolusing
- Educate on risk of trying to "trick the system"
- Backup contact numbers
- Implement Universal Early follow-up after initiation of pump

## Technology

- Pump upgrades due/recalls
- Clinic connectivity

# Interventions

- **Diabetes Technology Clinic** with MD provider (Dr. Williams) and CDE (Barb Klingler, RN)





# Tech Clinic Checklist

## Healthcare Maintenance

- Annual lipids, TSH, CMP, CBC, UACR, Ophthalmology for retina exam
- Celiac screen once and/or when symptoms
- HbA1c Q3 months
- Foot exam
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- Treatment of hyperglycemia
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Red – Completed by MD

Blue – Completed by CDE

## Education/Training

- General diabetes management
- Carbohydrate counting
- CGM: insertion of sensors, replacing sensors, how to troubleshoot sensor failures
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- Educate on risk of trying to “trick the system”
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## Technology

- Pump upgrades due/recalls
- Clinic connectivity



# Chart Review of Insulin Pump Clinic

- Pre-intervention (N = 90)
  - **39%** had a CDE visit in the last year
  - **56%** have no active prescription for needles/syringes
  - **52 %** have no documented plan (last year)
  - **66%** have no active basal insulin prescription
  - Only **33%** have all components of a successful pump failure back up plan
- Post-intervention (N = 64)
  - **98%** had a CDE visit in the last year
  - **65%** have an active prescription for needles
  - **98%** have a documented plan (last year)
  - **84%** have an active basal insulin prescription
  - **64%** have all components of a successful pump failure back up plan



Increase documentation of a pump failure plan and insulin prescriptions and supplies by **50% in the next 12 months** in adult patients with type 1 and type 2 diabetes treated with an insulin pump, followed at the outpatient Washington University Diabetes Center to promote successful insulin pump management.

# Conclusions



- All patients using insulin pumps should have backup plans in the setting of pump failure
- Successful components include:
  - CDECES involvement at least yearly improves care
    - Increased documentation
    - Increased basal prescriptions prescribed
    - Increased confidence (data pending)
- Learning opportunities

# Next steps



- Collect more patient surveys on confidence with back up plans
- Implementation to other providers





Baylor  
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DEPARTMENT OF  
PEDIATRICS



# Optimizing Automated Insulin Delivery System use in Youth with Recent Onset T1D

**Mili Vakharia, FNP-C, CDCES, Daniel J. DeSalvo, MD, Sarah K. Lyons, MD, Don Buckingham, MBOE, CPHQ, Sarah Kelly, DNP, NP-C, Siripoom McKay, MD, Rona Sonabend, MD, Grace Kim, MD**

**Division of Pediatric Diabetes and Endocrinology, Department of Pediatrics,  
Baylor College of Medicine/Texas Children's Hospital, Houston, Texas, USA,  
[Vakharia@bcm.edu](mailto:Vakharia@bcm.edu)**

**The 8<sup>th</sup> Annual 2024 T1D Exchange-QI Learning Session**

**Date: November 11, 2024**





# Texas Children's Hospital

## Patients

- Yearly average 378 newly diagnosed T1D
- Total 3947 patients with T1D

## Providers

- 35 Endocrinologists
- 10 APPs
- 5 psychologists

## Ambulatory staff & leadership

- 3 CDE/RD leadership
- Practice administrator
- CDCES/RD: ~30
- 2 Patient navigators
- SW: ~4
- MAs & Nurses

## Diabetes clinics

- 4 major hospital campuses
- 6 satellite clinics

# Background

Published data & guidelines recommend AID for youth with T1D to alleviate diabetes burden and improve associated health outcomes.

Standardized technology education is important for successful optimization of new devices.



Develop new standard of practice: "AID Systems"

Desrochers, H.R., Schultz, A.T., & Laffel, L.M. (2020). Use of Diabetes Technology in children: Role of Structured Education for Young People with Diabetes and Families. *Endocrinology Metabolism Clinical North America*, 49(1). 19-35: doi:10.1016/j.ecl.2019.11.001.

Sherr, J.L., Tauschmann, M., Battelio, T., Bock de M., Forlenza, G., Roman, R., Hood, K.K., & Maahs, D.M. (2018). ISPAD Clinical Practice Consensus Guidelines 2018: Diabetes Technologies. *Pediatric Diabetes*, 19(27): 302-325.

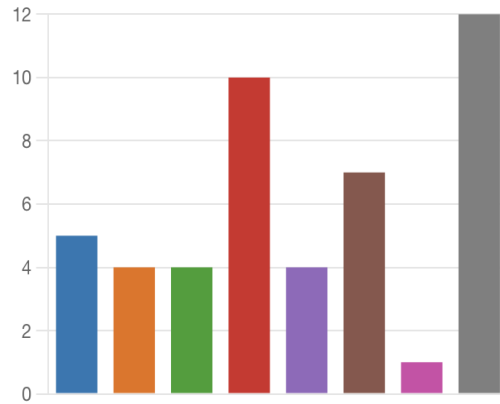
Sherr, J.L., Heinemann, L., Fleming, G.A. *et al* (2023). Automated insulin delivery: benefits, challenges, and recommendations. A Consensus Report of the Joint Diabetes Technology Working Group of the European Association for the Study of Diabetes and the American Diabetes Association. *Diabetologia*, 66, 3–22. <https://doi.org/10.1007/s00125-022-05744-z>

# Balancing measures: Provider / staff needs assessment survey

5. Which of the following pump therapy related topics would you like additional training or education on? (0 point)

[More Details](#)

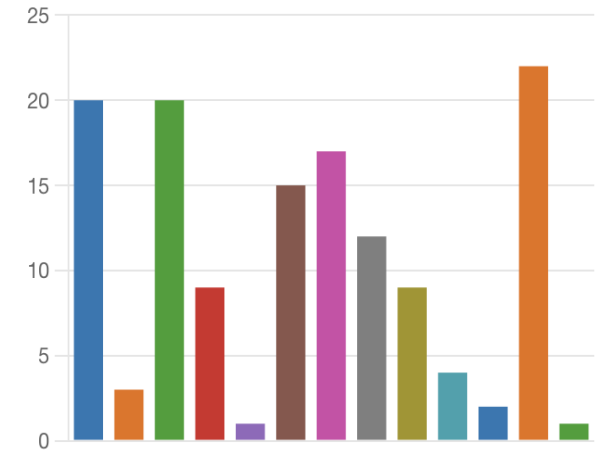
Pump start process	5
Closed loop technology	4
Sick day or ketosis management	4
General troubleshooting such as...	10
Pattern recognition & managem...	4
Managing hypoglycemia on pu...	7
Other	1
None of the above	12



2. Which of the following potential barriers do you think affect your decision on initiating insulin pump therapy in general? (0 point)

[More Details](#)

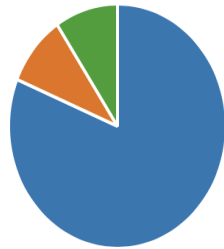
Financial (cost, insurance covera...	20
Age of the patient	3
Lack of diabetes skills/ knowled...	20
Lack of CGM device	9
Labs (HbA1c 8-10 or >10)	1
Non adherence to diabetes care...	15
High risk social situation or men...	17
Limited parental support or sup...	12
Technology barriers (phone not ...	9
Language (non-English speakin...	4
Provider comfort/ experience	2
Patient or parent hesitation	22
Other	1



6. How likely are you to prescribe closed loop technology to your patients? (0 point)

[More Details](#)

Very likely	26
Somewhat likely	3
Neither likely nor unlikely	3
Somewhat unlikely	0
Very unlikely	0



**The aim of this survey is to understand the potential parental concerns about an insulin pump start.** This is a brief survey and should not take more than 3 minutes to complete. Your participation is voluntary, and the responses are completely anonymous. Please do not provide your name or other identifying information.

1. How old is your child? \_\_\_\_\_ years
2. Are you concerned about your child having to wear an insulin pump?
  - A. Yes 14/43 (32%)
  - B. No
3. If the answer is “Yes” to the 2nd question, what concern(s) do you have? **(Please choose all that apply)**
  - A. I am concerned about the **risk of the pump breaking or pulling out** 9/14
  - B. I think my child is so small to start an insulin pump. 1/14
  - C. I am concerned that another caregiver or school personnel would not understand how to use the pump. 4/14
  - D. I am worried about skin reactions / rashes with the use of an insulin pump. 5/14
  - E. I have concerns about my child to have more low blood sugars with insulin pump. 2/14
  - F. I am worried that my child would have more high blood sugars with insulin pump. 0/14
  - G. I think the pump costs too much. 2/14
  - H. I have concerns about language barriers to using a pump. 1/14
  - I. **I do not think I know much about the insulin pump.** 8/14
  - J. I think an insulin pump is too difficult to understand. 0/14
  - K. My **provider has never discussed an insulin pump with me** 6/14
  - L. I have other concerns (please explain) \_\_\_\_\_
4. If you have no concerns but just don't want to do an insulin pump, what is the reason why an insulin pump would not help your child?

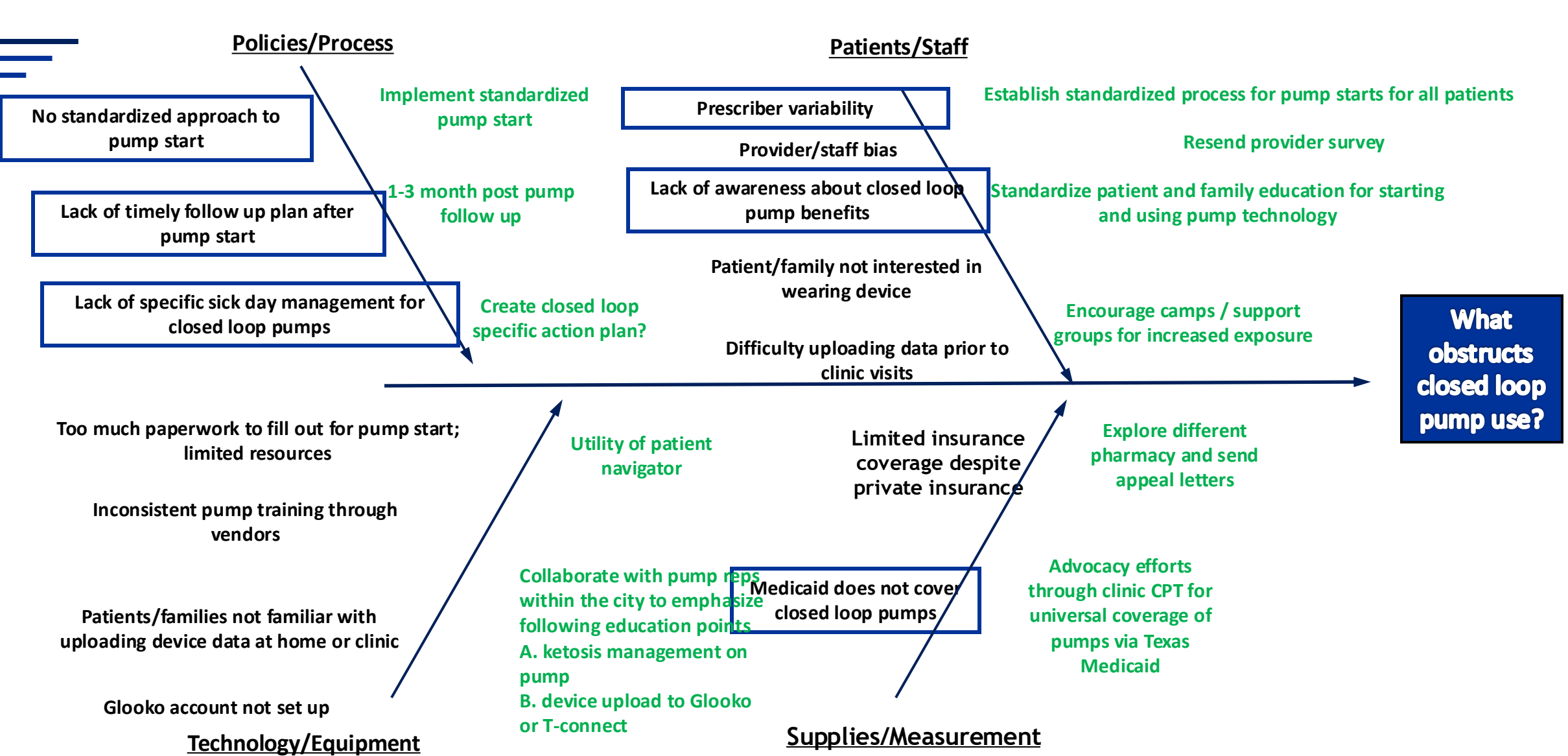
Thank you for your participation in the survey. We appreciate your time and help.

Kelly Hicks, MD and Serife Uysal, MD



- Increased education and guidance on pump breaking and pulling out (Pump Action Plan).
- Spread the word at each visit ! Flyers, Quarterly newsletters?
- **68% → No parental concerns but, child not interested. Stimulate interest at each visit.**



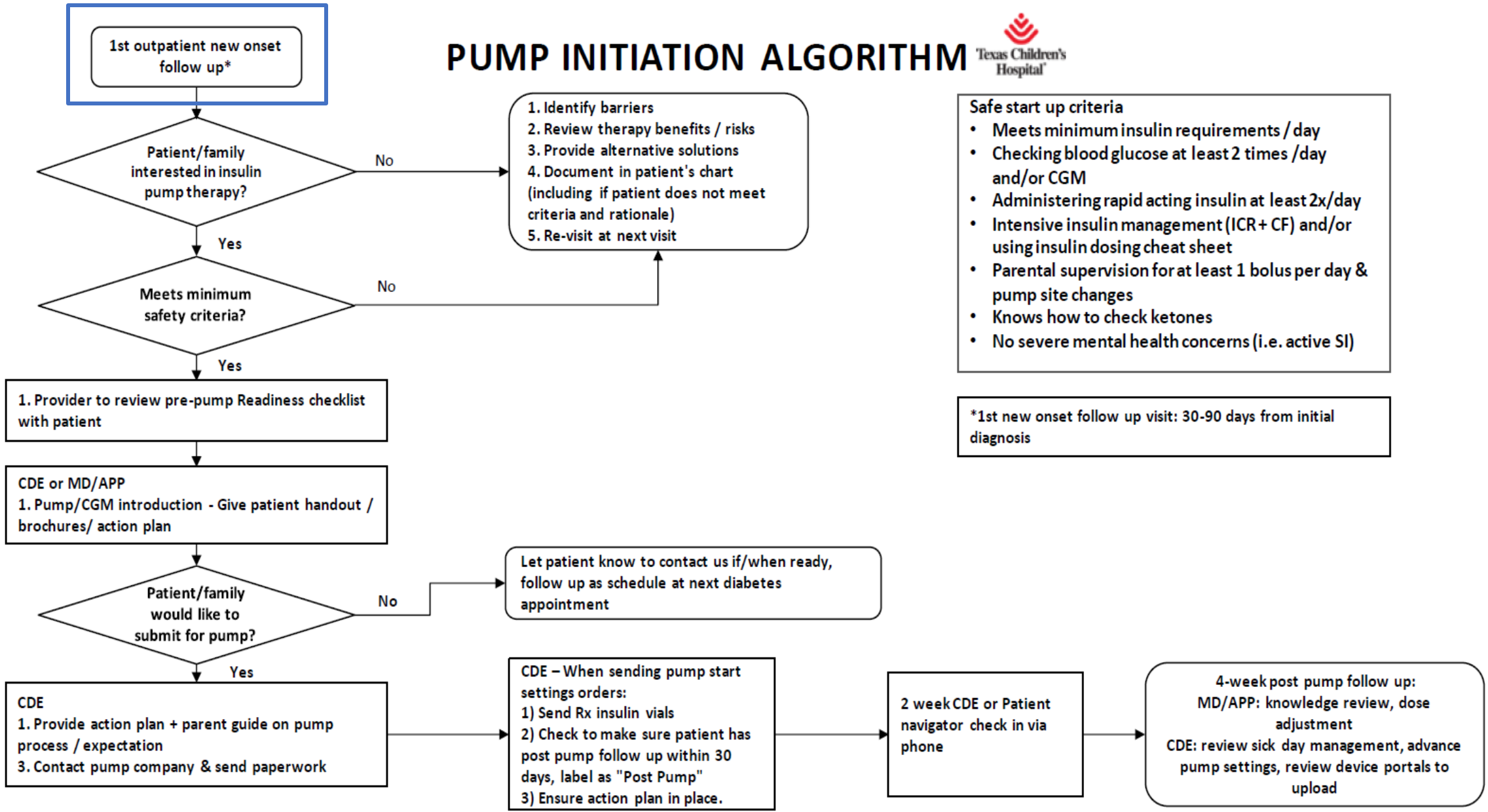




## SMART Aim

**Increase AID system use in all recent onset T1D patients, less than 1 year from diagnosis, by 20% from baseline of 1.2%, by July 2024.**

# PUMP INITIATION ALGORITHM

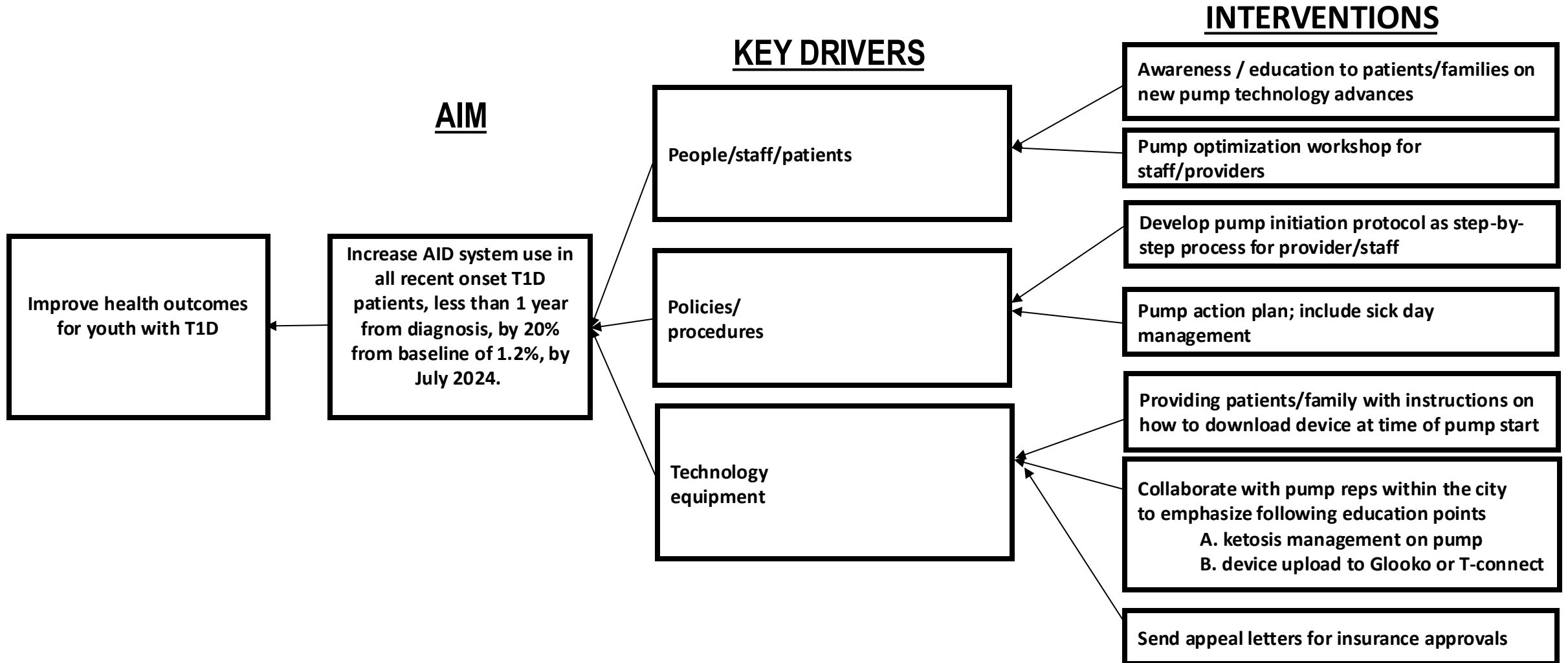


- Safe start up criteria**
- Meets minimum insulin requirements / day
  - Checking blood glucose at least 2 times /day and/or CGM
  - Administering rapid acting insulin at least 2x/day
  - Intensive insulin management (ICR+ CF) and/or using insulin dosing cheat sheet
  - Parental supervision for at least 1 bolus per day & pump site changes
  - Knows how to check ketones
  - No severe mental health concerns (i.e. active SI)

\*1st new onset follow up visit: 30-90 days from initial diagnosis



# Key Driver Diagram (Closed loop technology)



# Automated Insulin Delivery Technologies Workshop

- Review FDA approved devices
  - Omnipod 5 (>2yo)
  - Tandem Control-IQ (>6yo)
  - Medtronic MiniMed (>7yo)
  - Beta bionics iLet system
- DKA risk
- Clinical pearls on managing patients on pumps



# Pump Action Plan to include closed loop/AID & sick day recommendations

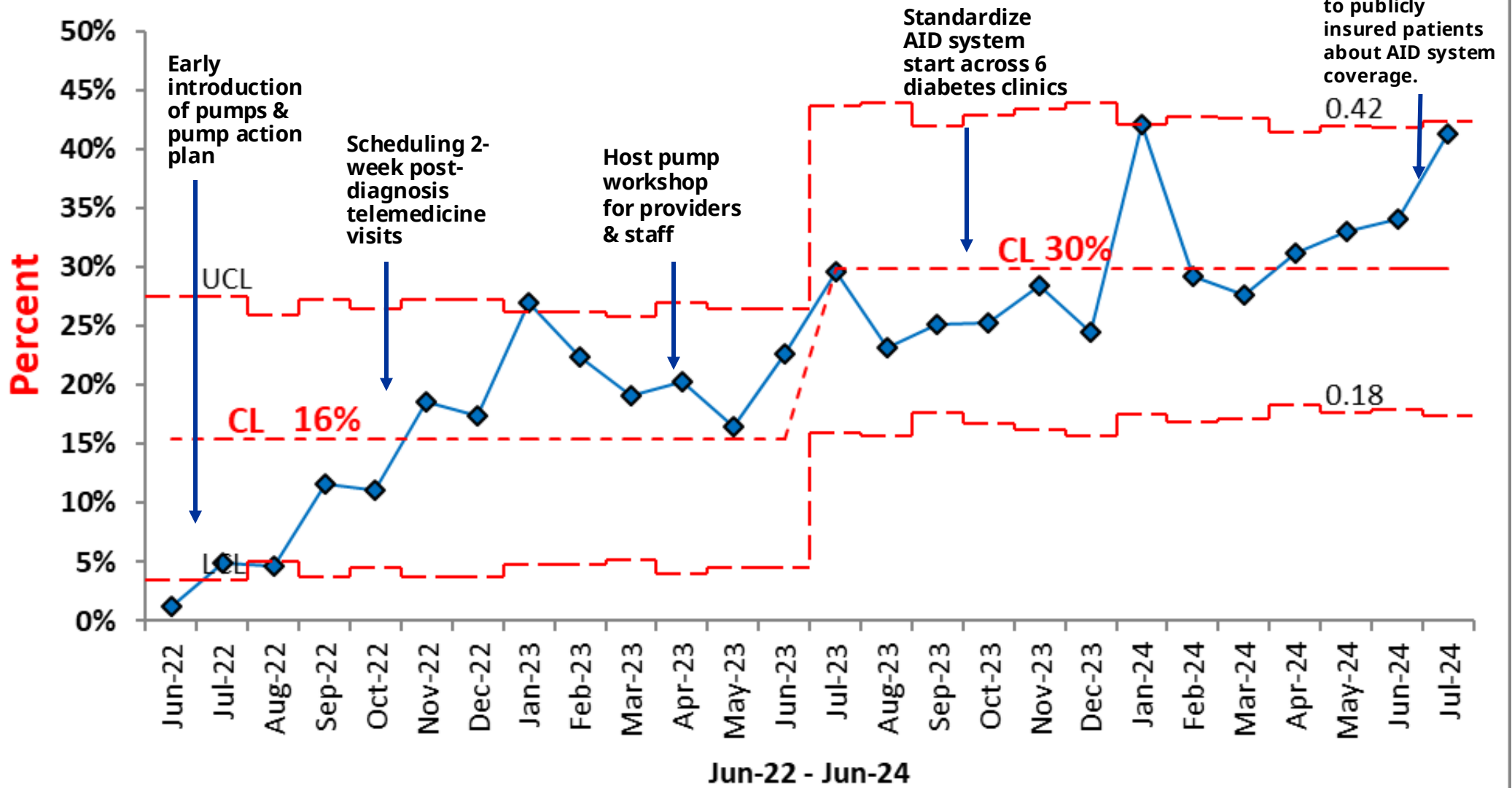
	<p><b>Know your back up insulin regimen for injections in case of pump failure:</b>  <b>Lantus/Basaglar/Tresiba/Semglee</b> (long acting/basal insulin): <u>***</u> units.  <ul style="list-style-type: none"> <li>If pump is discontinued, give first dose within 2 hours and every 24 hours until pump restarted. Wait 24 hours after last dose of basal insulin (<u>long acting insulin</u>) before you restart pump.</li> </ul> <b>Humalog/Novolog/Fiasp/Lyumjev/Apidra</b> (rapid acting):  <ul style="list-style-type: none"> <li>Carb ratio: 1 unit for every <u>***</u> grams of carbohydrate</li> <li>Correction factor: 1 unit for every <u>***</u> mg/dL over target blood glucose of <u>***</u> mg/dL</li> <li>Round to the nearest half unit if using half unit doses</li> </ul>           Note: If doses have changed since this Action Plan was created and you are unsure of updated doses, please call clinic.         </p>
	<p><b>If blood glucose (BG) is less than 250 mg/dL</b></p>
	<ul style="list-style-type: none"> <li>Continue giving insulin via pump</li> <li>Continue checking BG via CGM device OR meter per usual management</li> <li>If most BG greater than 200 for more than 3 days, call clinic for blood glucose review as insulin doses may need adjustment</li> </ul>
	<p><b>If BG greater than 250 mg/dL with NEGATIVE, TRACE or SMALL urine ketones (blood ketones 0-1 mmol)</b></p>
<p>Bolus via pump first</p> <p>if 3h later BG still high, change pod/infusion + insulin</p>	<ul style="list-style-type: none"> <li>Drink plenty of sugar free fluid or water</li> <li>Give correction bolus via pump</li> <li>Re-check blood glucose and ketones in <b>3 hours</b>. If BG is still greater than 250 mg/dL, recommend CHANGING POD or INFUSION SET + CARTRIDGE/INSULIN then GIVE CORRECTION BOLUS through pump, recheck BG in 2-3 hours.</li> <li>If most BG greater than 200 for more than 3 days, call clinic to review as insulin doses may need adjustment</li> </ul>
<p>First correction dose syringe/pen, then change pod/infusion + insulin</p> <p>Fluid recs</p>	<p><b>If BG greater than 250 mg/dl with MODERATE or LARGE urine ketones (blood ketones 1.1 or higher)</b></p> <ul style="list-style-type: none"> <li><b>GIVE FIRST CORRECTION DOSE WITH SYRINGE/PEN (Novolog/Humalog/Fiasp/Lyumjev/Apidra).</b> If moderate ketones, add 10% to usual correction dose. If large ketones, add 20% to usual correction dose.</li> <li><b>CHANGE POD or INFUSION SET + CARTRIDGE/INSULIN after giving correction dose with syringe/pen.</b></li> <li>Re-check ketones and correct every <b>3 hours</b> by <u>bolusing</u> through pump until ketones are trace or negative.</li> <li><b>If Ketones are not trending down (from moderate/large) or not able to tolerate fluids and need further guidance needed, call Diabetes Emergency Line (832-822-3670, Option 0)</b></li> <li><b>Monitor glucoses closely.</b></li> <li>Drink sugar free fluids or water until BG less than 250 mg/dL. Once below 250 mg/dL, begin sipping on carb-containing fluids like Gatorade/ Powerade/ Juice to reduce risk of lows and ensure safely able to get enough insulin to help clear ketones.</li> </ul>



# Results

In patients with T1D duration of <1 year, AID system usage has increased from a **baseline of 1.2% in June 2022 to over 30% in July 2024** and remains sustained.

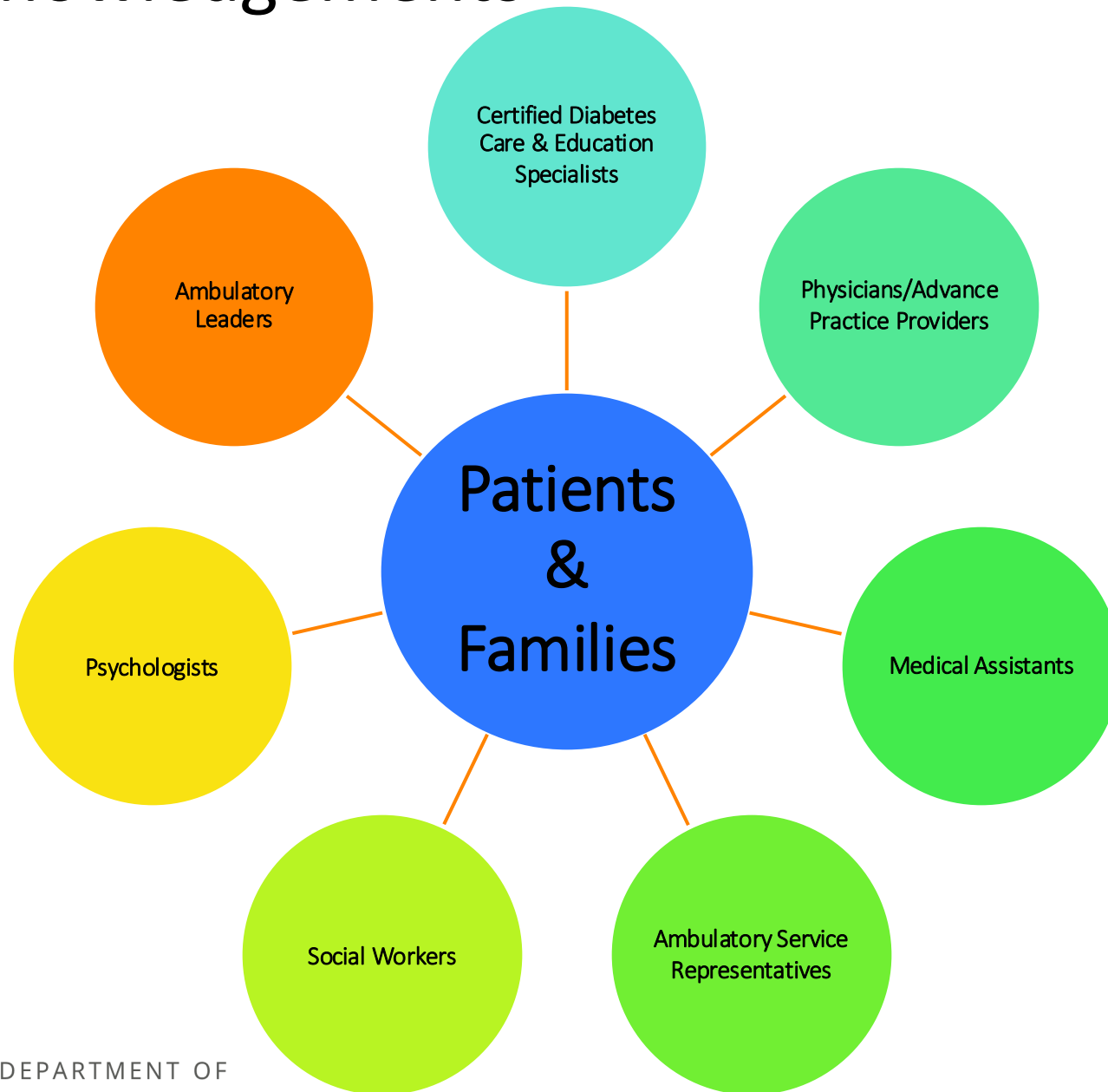
# AID System use in Youth with Recent Onset T1D



# Lessons Learned & Next Steps

- AID system use is the standard of practice to improve diabetes technology access and patient outcomes
  - Ongoing awareness & education to providers, staff, patients/families
- Barriers/Challenges
  - Address patients without access to cell phones
  - New strategies to address health inequities, patients with lack of interest in technology
- Implement pump safety plan for school
- Closely monitor DKA rates on pumps
- Evaluate HbA1c data on pump vs IIM
  - Can we impact those with A1c 7.5 - 9 %?

# Acknowledgements



- **Don Buckingham, MBOE, CPHQ**
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- **T1D Exchange**
- **Hemsley Charitable Trust**





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Montefiore EINSTEIN

# Montefiore Einstein

## Improving Continuous Glucose Monitors Prescribing Behaviors in Primary Care

Jovan Milosavljevic, MD; Rohan Maini, MD; Jing-Yu-Pan, MD; Priyanka Mathias, MD; Justin Mathew, MD; Michael Greenberg, NP; Sarah Baron, MD, MS; Sharon Rikin, MD, MS; Shivani Agarwal, MD, MPH

Montefiore Medical Center

Albert Einstein College of Medicine, Bronx, NY, USA



# Presenter Disclosure

Disclosed no conflict of interest

# Continuous glucose monitoring (CGM)

- CGM is an evidence-based intervention
- Provides data-driven, convenient diabetes management
- Multiple RTCs show reduction in HbA1c, improved QoL
- Standard of care for people with diabetes: both T1D and T2D

## 7. Diabetes Technology: *Standards of Care in Diabetes—2024*

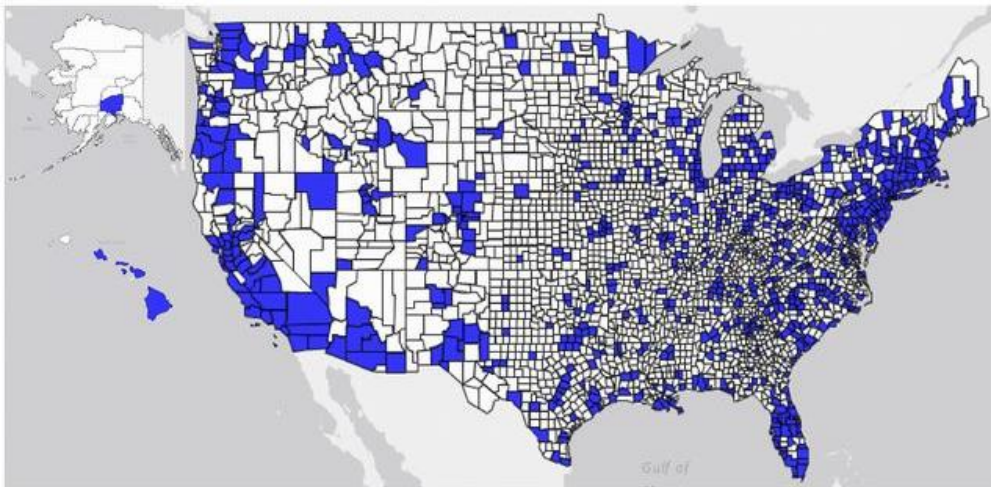
*Diabetes Care* 2024;47(Suppl. 1):S126–S144 | <https://doi.org/10.2337/dc24-S007>

### **Recommendations**

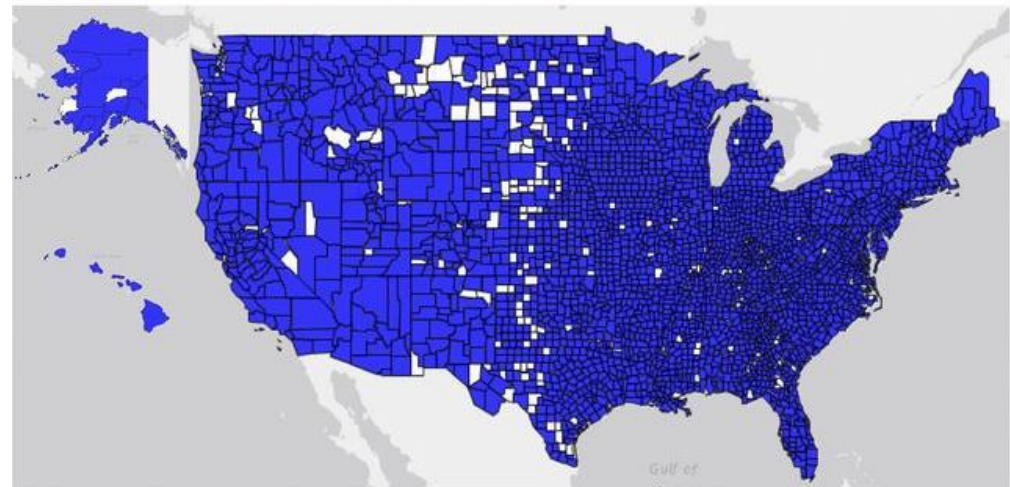
rtCGM should be offered for diabetes management in adults with diabetes on basal insulin (grade A), MDI or CSII (grade A)

# Problem: low uptake in primary care

- The majority of diabetes visits happen
- National shortage of endocrinologists
- Critical need to expand CGM to improve population health outcomes

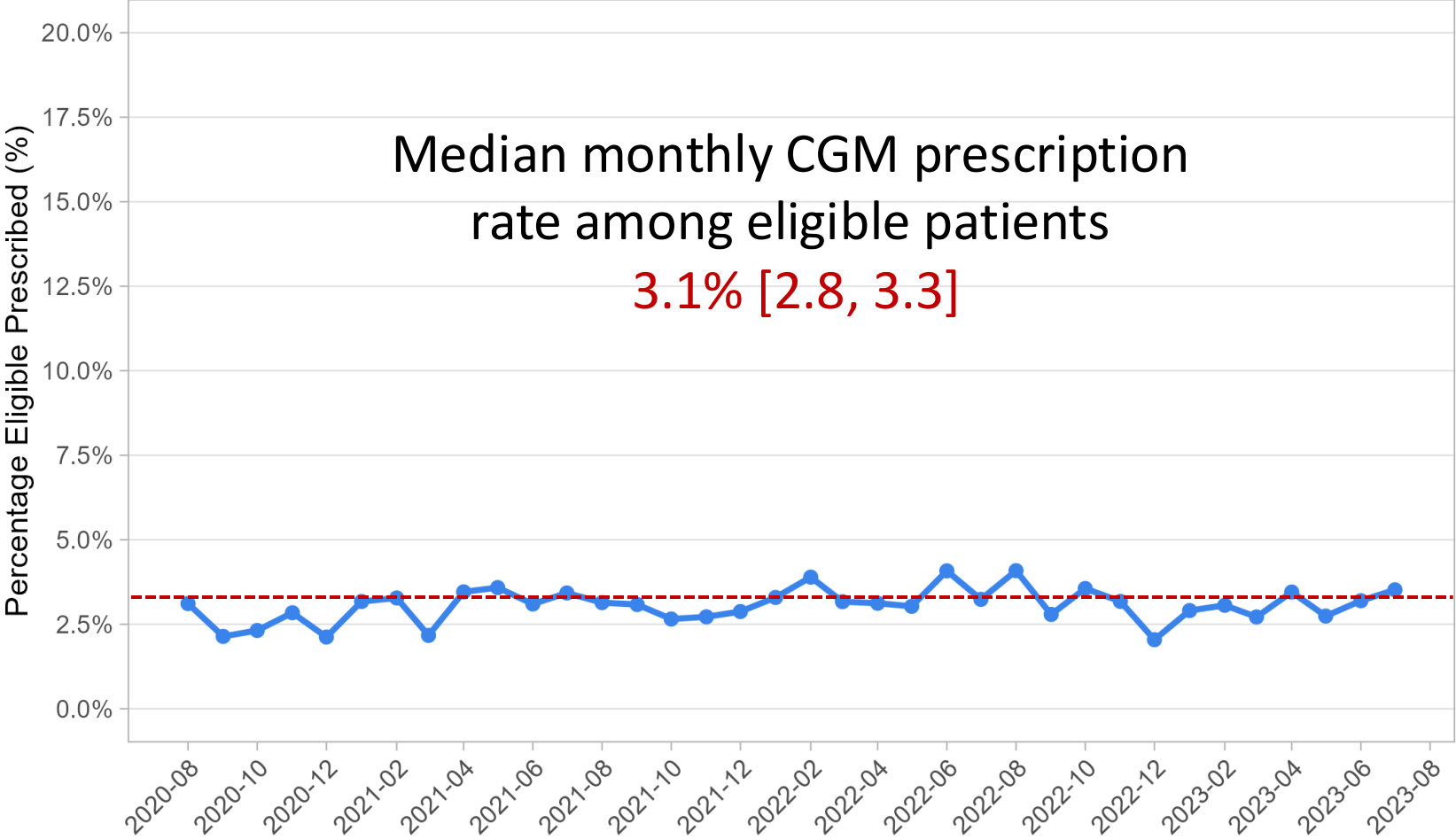


US counties with  $\geq 1$  adult or peds endocrinologist



US counties with  $\geq 1$  primary care provider

# Very low CGM prescribing rate among insulin-treated patients with T2D seen at Montefiore primary care clinics over 3 years (2020-2023)

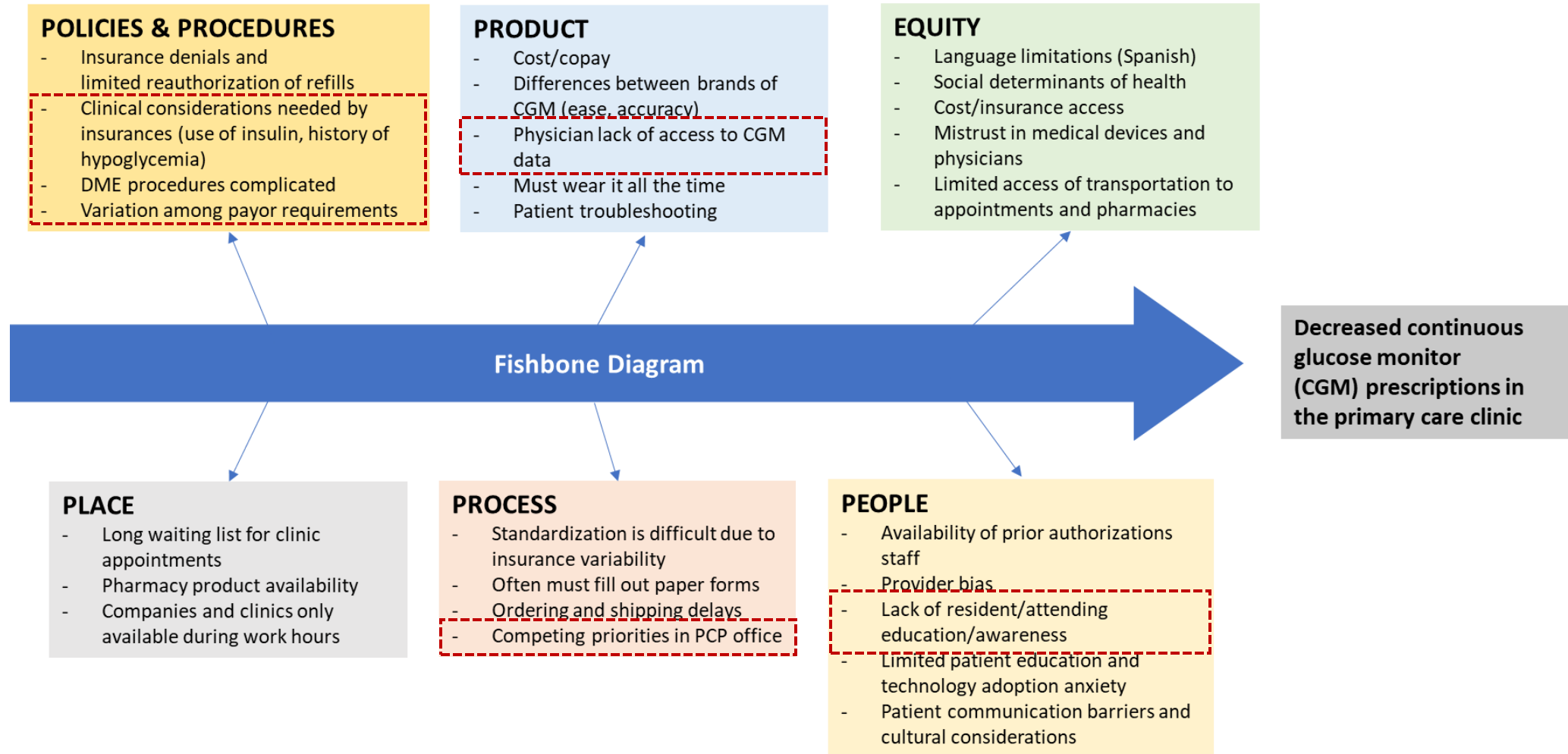


Data from 13 primary care sites and 11,037 patients with type 2 diabetes on insulin.

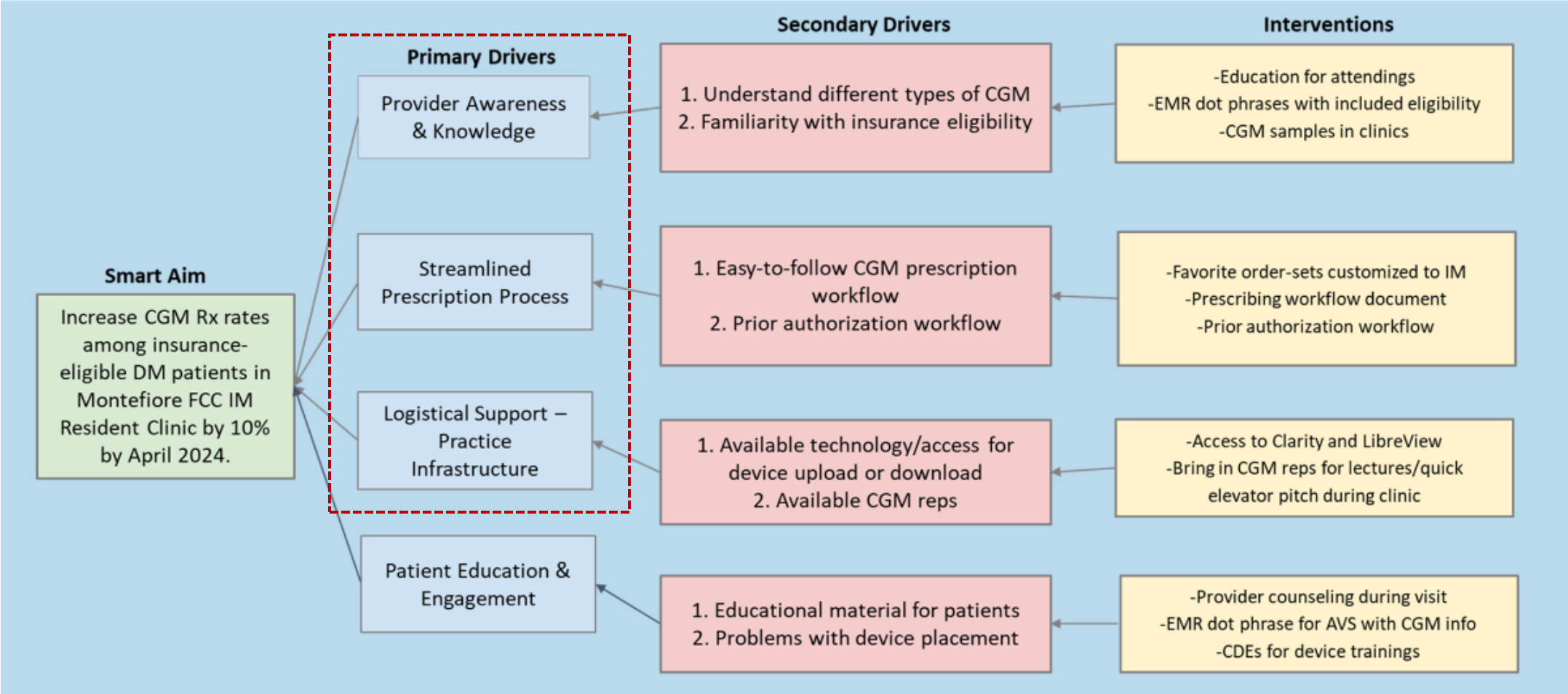
# Smart Aim

To increase **CGM prescription rates** for adults with **insulin-treated** diabetes at Montefiore Family Care Center **Internal Medicine** Clinic by 10% from September 2023 to June 2024

# Discovery phase



# Key Driver Diagram

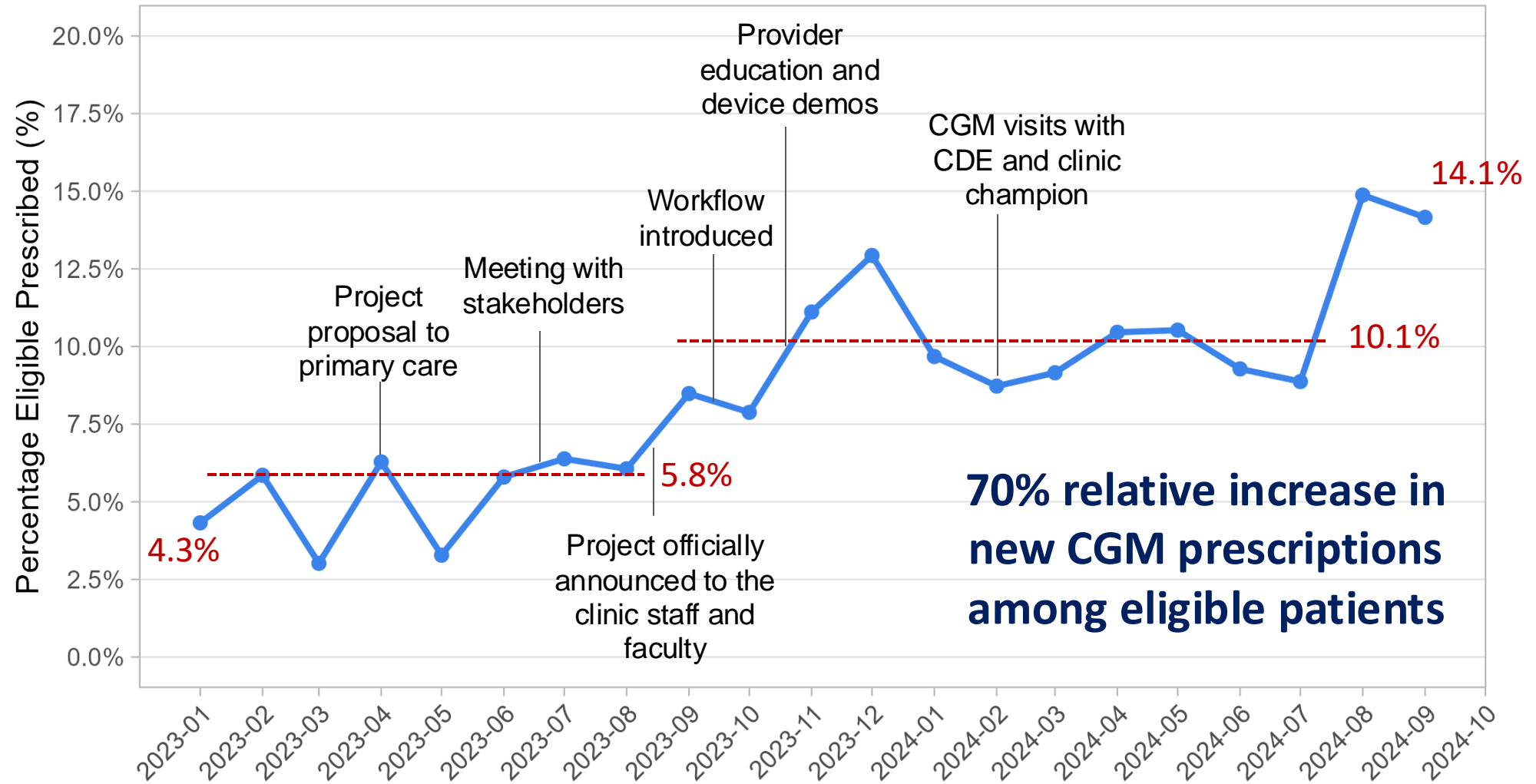


# Outcome measures

- **Initial CGM prescription rates:**
  - *Numerator:* patients with a new CGM prescription (no prior CGM in past 2 years)
  - *Denominator:* patients with diabetes on insulin in the reporting month, no prior CGM
  
- **Overall CGM prescription rates:**
  - *Numerator:* patients with continued or new CGM prescription in the reporting month
  - *Denominator:* patients with diabetes and insulin prescription in the reporting month
  
- Data source: EHR

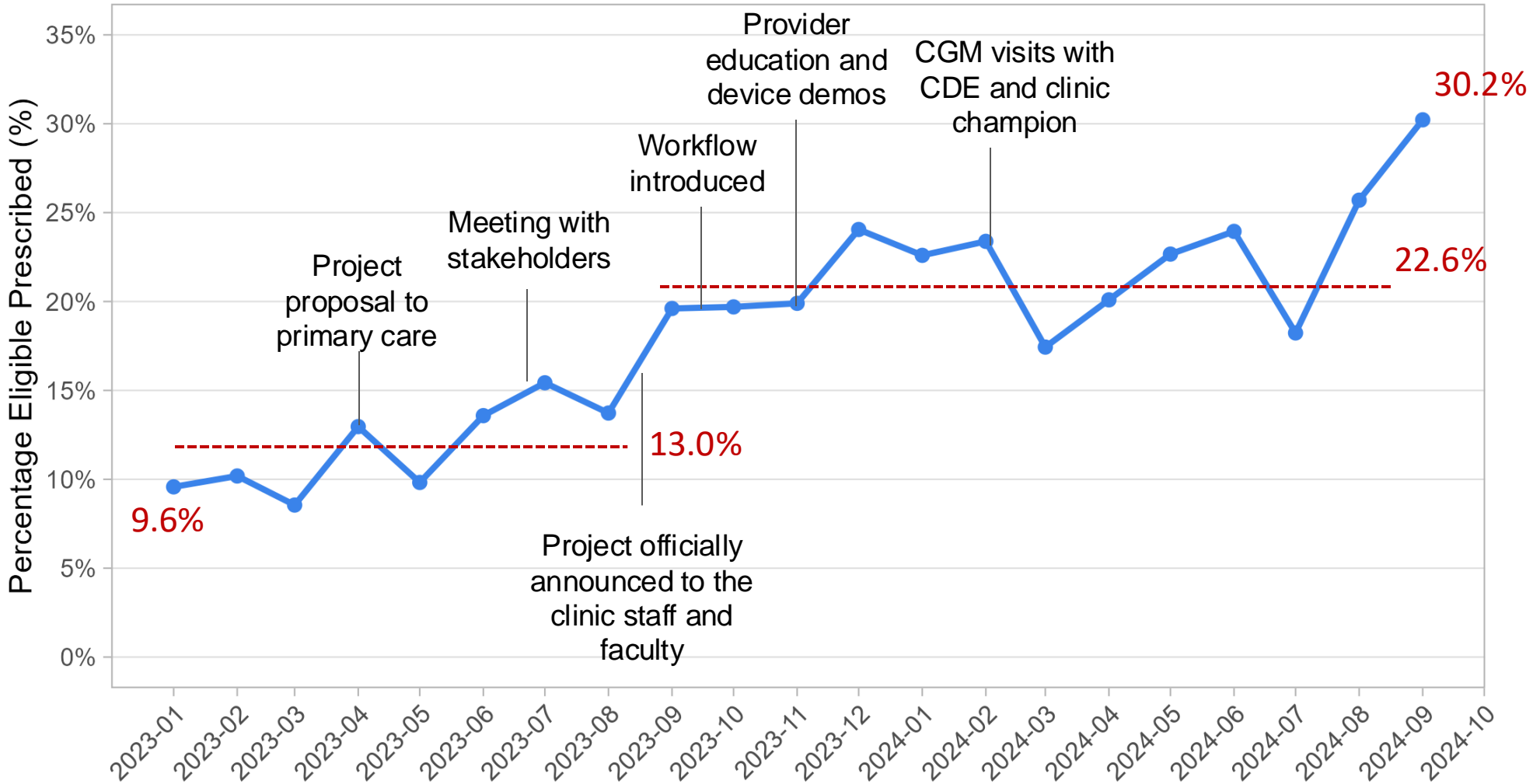


# PDSA cycles: initial CGM prescription rates



**70% relative increase in new CGM prescriptions among eligible patients**

# PDSA cycles: overall CGM prescription rates



Data from 1,0663 patients and 4,570 office visits.

# Key lessons learned

- Optimization of prescription process and targeted education can increase CGM prescribing rates
- Multidisciplinary approach allows for successful spread of interventions from specialty to primary care clinic
- Modest increase over a short period of time, however important activation of primary care providers
- Further scaling and sustained efforts are needed for more significant and widespread impact

# Acknowledgment



Montefiore



Shivani Agarwal, MD, MPH

Michael Greenberg, NP

Justin Mathew, MD

Priyanka Mathias, MD

Rohan Maini, MD

Jing-Yu Pan, MD

Sarah Baron, MD, MS

Sharon Rikin, MD, MS

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Correspondence: [jmilosavlji@montefiore.org](mailto:jmilosavlji@montefiore.org), [shivani.agarwal@einsteinmed.edu](mailto:shivani.agarwal@einsteinmed.edu)