

Mili Vakharia APRN, FNP-C, CDCES, Sarah Lyons, MD, Don Buckingham, MBOE, CPHQ, Daniel DeSalvo, MD, Rona Sonabend, MD, and Grace Kim, MD

Background

- Insulin pump therapy leads to improved glycemic control, reduced hypoglycemia, alleviation of diabetes burden and enhanced quality of life
- International Society of Pediatric and Adolescent Diabetes and American Diabetes Association support need for structured technology education for children and youth with diabetes
- Insulin pump therapy is recommended as main mode of insulin delivery for those under age 7 years with type 1 diabetes mellitus (T1D)

Burning Platform

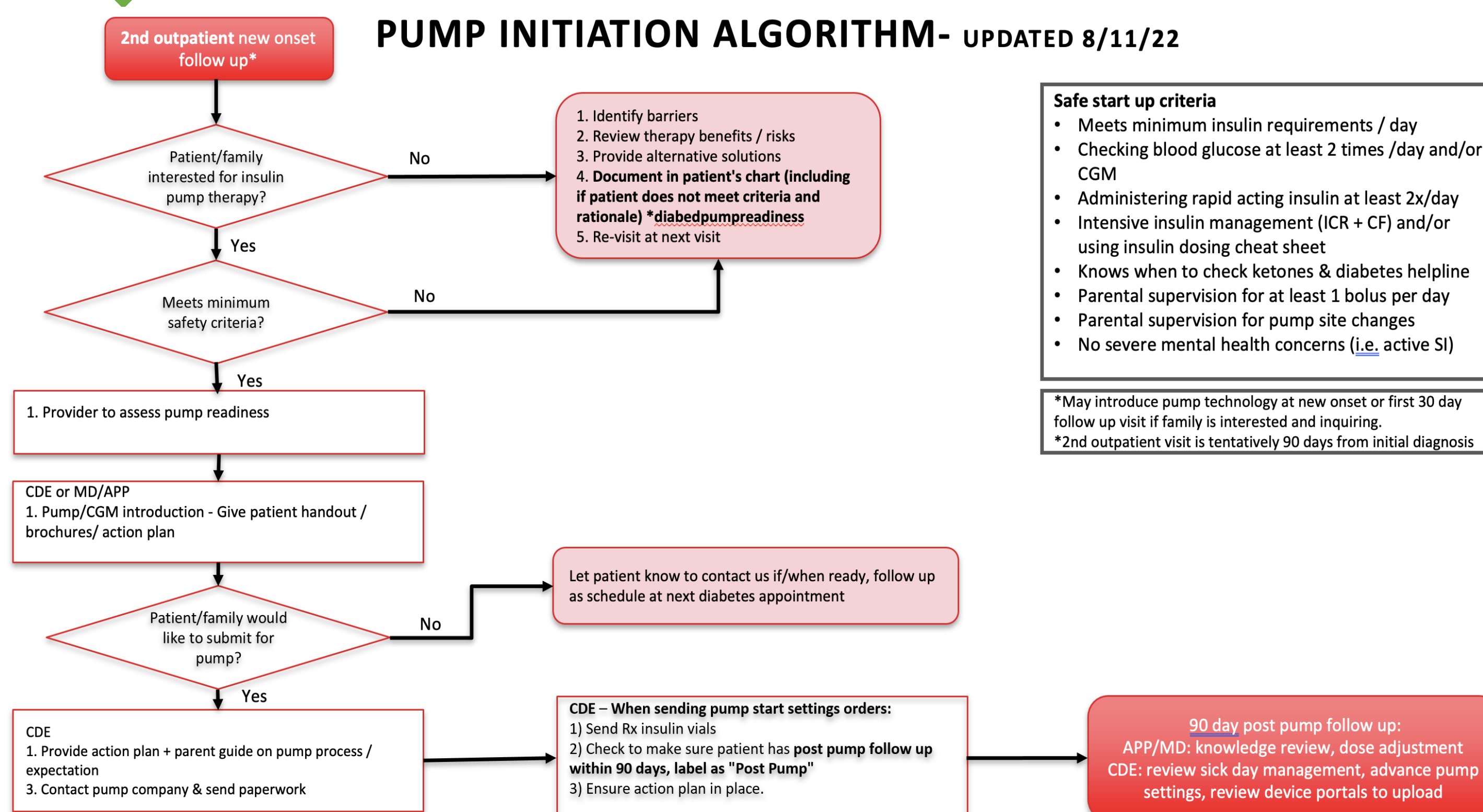
- Our diabetes care center noted decreased insulin pump utilization when compared to peer institutions
- Furthermore, general prescribing barriers were also deemed to be of concern
- Prior to implementation of this quality improvement project, a lack of standardized process for insulin pump initiation existed within our division
- As such, a multidisciplinary team of pediatric endocrinologists, advance nurse practitioners, diabetes educators and hospital leaders implemented QI initiatives aimed at increasing insulin pump use

Aims

- By end of summer 2022, increase insulin pump use in new onset T1D patients (less than 1 year from diagnosis) by 5% at Texas Children's Hospital, The Woodlands (community campus)
- The secondary objective of this project was to standardize the approach to insulin pump initiation

Methods/Materials

- PDSA 1:**
- P: Educated providers and diabetes educators about the new onset pump initiation protocol, safe start criteria, pump action plan and pre and post pump visit checklist
 - D: Jan 2021
 - S: Increase percent initially
 - A: Adopt
- PDSA 2:**
- P: Implemented the new process of early introduction of pump technology and education to patients/families
 - D: Spring 2021
 - S: Clinically better to wait until second follow up at 90 days post diagnosis
 - A: Adapt- instead of introducing at 30 days post diagnosis, to introduce at 90 day
- PDSA 3:**
- P: Scheduled and labeled post-pump follow up visit with provider and diabetes educator
 - D: Summer 2021
 - S: Initially increased percent
 - A: Adopt
- PDSA 4:**
- P: Greatly simplified the process, action plan, reminding providers, diabetes educators about process
 - D: Fall 2021
 - S: Increased percent
 - A: Adopt



My Diabetes Pump Action Plan

Patient Name: _____ Date: _____

Back up insulin regimen:
 Lantus/Banaglar/Tresiba (long acting): _____ units once daily
 Humalog/Novolog/Fiasp/Lyumjev (rapid acting):
 Insulin to carbohydrate ratio (ICR):
 1 unit for _____ grams of carbs for breakfast
 1 unit for _____ grams of carbs for lunch
 1 unit for _____ grams of carbs for dinner
 Correction factor (CF): 1 unit for every _____ mg/dL above target BG _____ mg/dL

GO If blood glucose (BG) is 200-250 mg/dL

- Continue giving insulin via pump
- Continue checking BG with CGM device OR meter per usual management
- If high BG >200 for >3 days, call clinic to review BG log as insulin doses may need adjustment

WARNING If BG >250 mg/dL with NEGATIVE, TRACE or SMALL urine ketones (blood ketones <1 mmol)

- Drink plenty of sugar free fluid or water
- Give correction bolus via pump
- Re-check blood glucose and ketones in 2-3 hours. If BG is still >250 mg/dL, recommend give correction bolus via SYRINGE/PEN and CHANGE POOD or INFUSION SET, recheck BG in 2-3 hours.
- If high BG >3 days, call clinic to review as insulin doses may need adjustment

STOP If BG >250 mg/dL with MODERATE or LARGE urine ketones (blood ketones 1.1 or higher)

- Give correction bolus (Novolog/Humalog) via SYRINGE/PEN.
- DO NOT GIVE BOLUS VIA PUMP
- CHANGE FOOD or INFUSION SET
- Continue to correct 2-3 hours via syringe/pen until ketones are trace or negative
- Drink sugar free fluid or water - If unable to tolerate fluids, go to Emergency room!
- Call Diabetes Emergency Line (832-822-3670, Option 0)
- Once ketones are cleared, wait 3-4 hours from last insulin injection to give correction bolus via pump, as the pump will not recognize IOB provided from insulin syringe/pen injection

When to check for ketones?

- Sickness
- BG >250 mg/dl for 2 blood glucose checks (3 hours apart)
- Vomiting

What causes ketones?

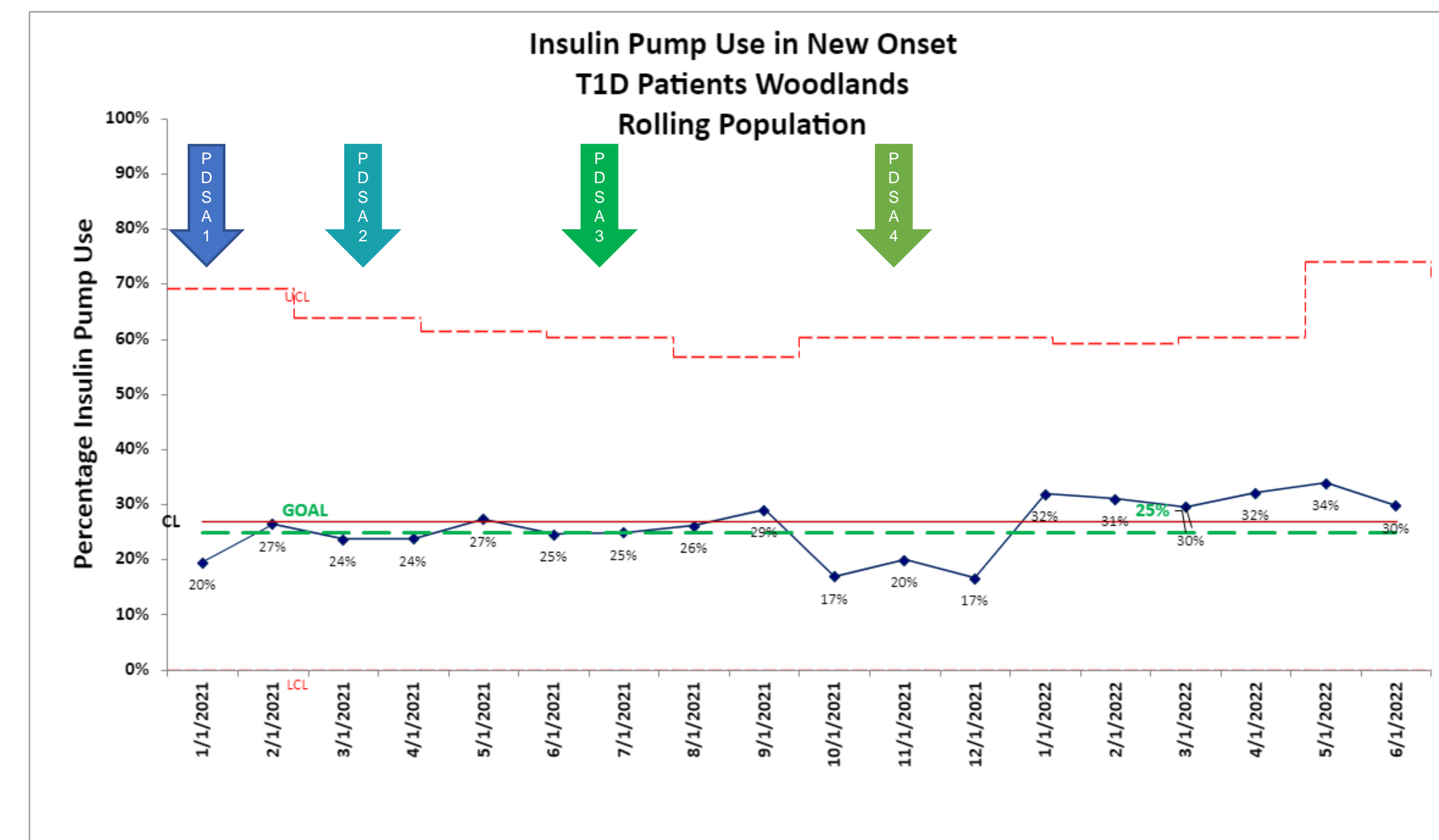
- Child is not getting enough insulin causing ketones to form. This could be due to any of the following:
 - Pump occlusion at infusion site
 - Infusion site leaking
 - Reservoir / pod is bad
 - Missed insulin dose
 - Expired insulin, or compromised insulin (exposed to heat or freezing temperatures)
 - Infusing into scar tissue

What are symptoms of Diabetic Ketoacidosis (DKA)?

- Nausea, vomiting
- Abdominal pain
- Difficulty breathing
- Confused / not acting like self
- Ketones not decreasing at next check
- Lethargy/altered mental status

Results

- In patients with T1D duration of <1 year, insulin pump use has increased from a baseline of 20% in January 2021 to ≥30% in January 2022 and remains sustained
- Given this improvement, we are spreading the initiative to additional TCH campuses



Conclusion

- Early standardized pathway and multidisciplinary education facilitates a structured way to increase the uptake of insulin pumps in youth with recent T1D
- It may also help reduce healthcare disparity via elimination of unconscious provider prescriber biases

References

- Available upon request
- Contact: Mili Vakharia @ mili.vakharia@bcm.edu