Integrating Technology: CGM, Connected Pens, and Insulin Pumps DiabetesEd Training Seminar 2026 – Day 2

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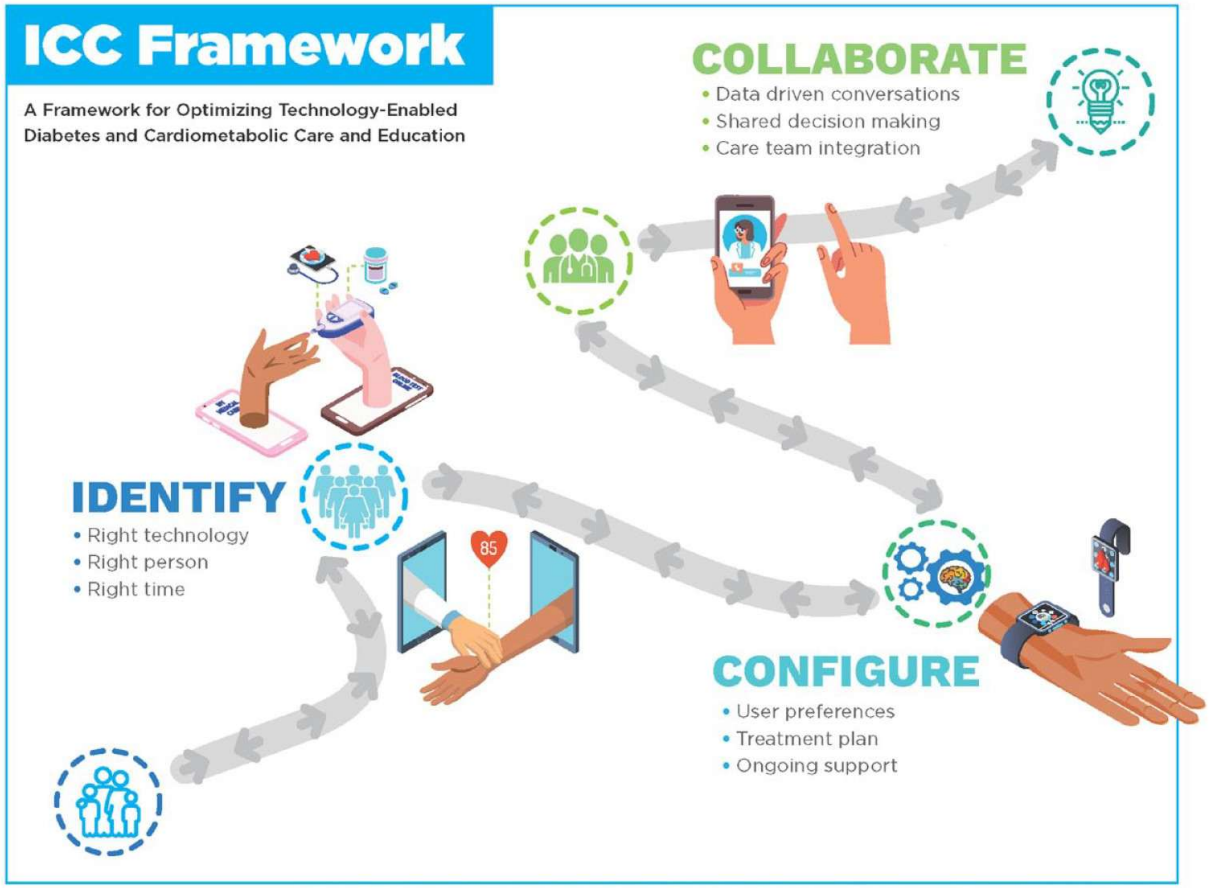
Learning Objectives

- Discuss continuous glucose monitoring (CGM) and the clinical benefits for managing diabetes
- Compare and contrast different CGM, insulin pump, and connected pen devices
- Describe critical teaching content for insulin pump, connected pen and CGM use
- Describe appropriate candidates for insulin pump therapy
- List inpatient considerations for insulin pump therapy and CGMs

ICC Framework – Identify-Configure-Collaborate

A framework to overcome barriers to technology use and therapeutic inertia



Greenwood DA, Howell F, Scher L, et al. A Framework for Optimizing Technology-Enabled Diabetes and Cardiometabolic Care and Education: The Role of the Diabetes Care and Education Specialist. The Diabetes Educator. 2020;46(4):315-322. doi:10.1177/0145721720935125

Technology is Here

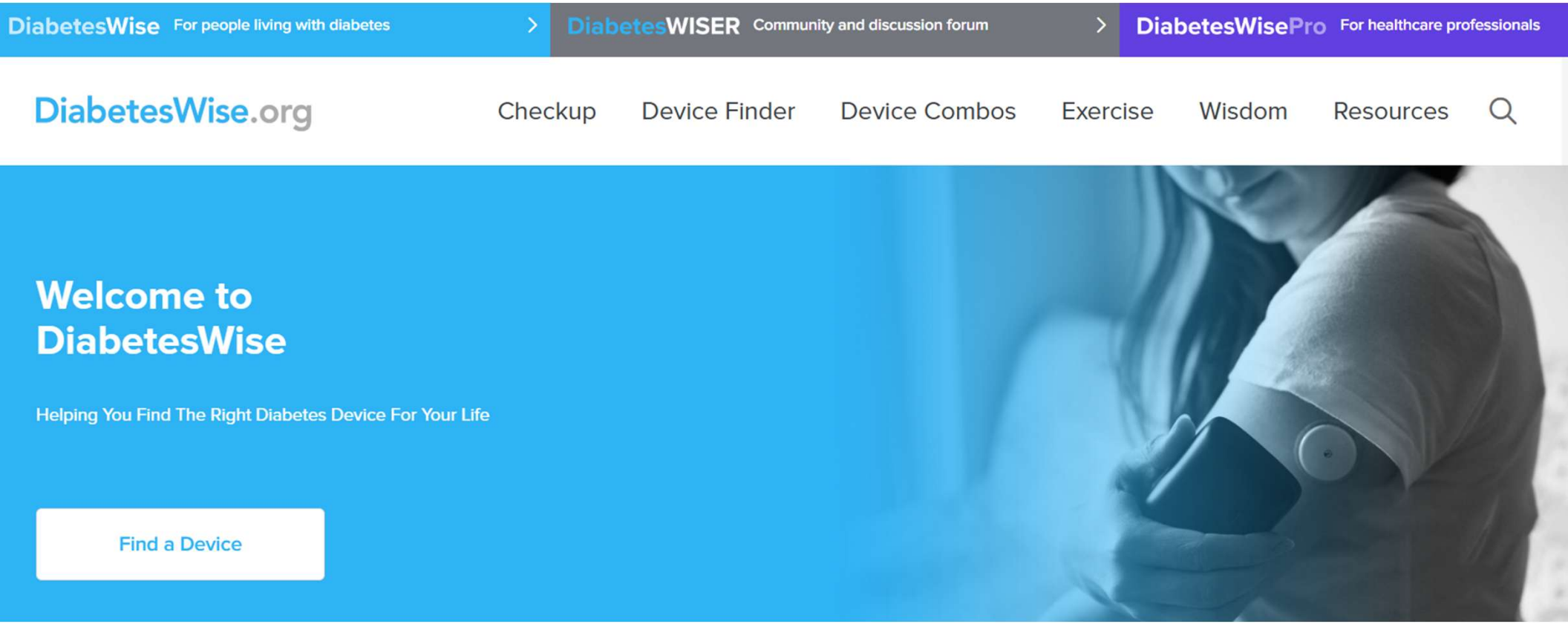
CONTINUOUS GLUCOSE MONITORS (CGM)

INSULIN PUMPS

CONNECTED PENS AND CAPS

MOBILE APPS

Identify: PWD Identify the “Right” Technology



Diabeteswise.org, providers.diabeteswise.org/#/

The Importance of Education & Training

"No device used in diabetes management works optimally without education, training, and ongoing support."

ADA. Diabetes Care.

Continuous Glucose Monitors

CGM: Real-Time Data

ADA Standards of Care 2026

American Diabetes Association®

- Diabetes devices should be offered to people with diabetes **(A)**
- Use of CGM is recommended at diabetes onset and anytime thereafter for children, adolescents and adults with diabetes who are on insulin (A) on nonsinulin therapies that can cause hypoglycemia (C) and on any diabetes treatment where CGM helps in management (C).
- The specific CGM device and method for use should be made based on the individual's circumstances, preferences and needs. (E)
- In people with diabetes on insulin therapy, CGM devides should be used as close to daily as possible for maximal benefit (A)
- People who wear CGM devices should be educated on potential interfering substances and other factors that may affect accuracy.

DI1

American Diabetes Association. *Diabetes Care*. 2026;

Slide 9

DI1 Updated slide.
Diana Isaacs, 2026-04-10T02:03:25.622

Types of CGM

	Professional	Personal	OTC
How to obtain	Owned by the clinic	Requires a prescription	Available without a prescription
Type	Blinded and unblinded (real-time feedback)	Real-time	Real time
Wear duration	Short-term use (10 days)	Long-term use	Short- or long-term use
Access	Insurance coverage for most people living with diabetes or prediabetes	Insurance coverage more focused on people taking insulin , although expanding	Cash pay, available to all adults
Compatibility	Smartphone app	Smartphones, reader/receiver, connected pens, mobile apps, insulin pumps	Smartphone app, mobile apps/Oura ring

Professional CGM

Characteristics	Dexcom G6 Pro
Blinded vs unblinded	Both
Maximum wear time of sensor	10 days
Calibration	None
Downloading reports	Clarity
Care between transmitter use	Disposable-1 time use, must attached transmitter
Alarms for high/low glucose alerts	Yes
Interfering substances	Hydroxyurea
Mobile app	Dexcom G6

ADCES Practice Paper. The diabetes care and education specialist role in CGM.

Personal CGM Options (Rx)

Freestyle Libre 2+

Freestyle Libre 3+

Eversense 365

Dexcom G6

Dexcom G7 DI1

Instinct

Simplera

DI1 Updated guardian to instinct.
Diana Isaacs, 2026-04-10T02:04:53.520

DI1

Personal CGM Comparison

	Dexcom G6	Dexcom G7	Dexcom G7 15 Day	Libre 2+	Libre 3+	Instinct	Simplera	Eversense 365
Max wear time	10 d	10.5 d	15.5 d	15 d			7 d	365 d
Warm-up time	2 h	30 min	1 h	1 h			Up to 2 h	24 h
Calibrations	Optional			None			Optional,	After 14 d, weekly
Water depth	8 ft, 24 h			3 ft, 30 min			8 ft, 30 min	3.28 ft, 30 min
Data platforms	Dexcom Clarity			LibreView		Carelink		Eversense Data Management System
Mobile apps	Dexcom G6, Clarity, Dexcom Follow	Dexcom G7, Clarity, Dexcom Follow		Libre, LibreLinkUp		CareLink connect, MiniMed mobile		Eversense
Reader, receiver, smartphone compatibility	Receiver, smartphone, watch			Reader, smartphone		Smartphone		Smartphone
Pump Inregration	T:Slim X2, Mobi, Omnipod 5, iLet		iLet, Omnipod 5	Omnipod 5	T:Sliim X2, iLet, Twiist	Minimed 780G		Twiist

Slide 13

DI1 updated
Diana Isaacs, 2026-04-10T02:09:46.852

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Personal CGM Comparison (cont'd)

	Dexcom G6	Dexcom G7	Dexcom G7 15 Day	Libre 2+	Libre 3+	Instinct	Simplera Sync	Eversense
FDA-approved sites	Abdomen (age 2+ y) Upper buttocks (age 2-17 y)	Upper arm (age 7+ y) Upper buttocks (age 2-6 y)		Upper arm			Upper arm, abdomen Upper buttocks (age 2-13 y)	Upper arm
Approved in pregnancy	No	Yes		Yes			No	No
Transmitter	3 mo	Disposable		Disposable			Charge weekly	Charge daily
FDA-approved ages (years)	≥ 2	≥ 2		≥ 2			≥ 7	≥ 18
Alarms	High, low, predictive (20 min), rise/fall rates	High, low, predictive (20 min), rise/fall rates, delayed first alert		High, low			High, low, predictive (60 min), rise/fall rates	High, low, predictive (30 min), rise/fall rates
Drug interactions	Hydroxyurea, acetaminophen (> 4 g/d)			Vitamin C (> 1 g/d)			Acetaminophen, hydroxyurea	Tetracycline antibiotics, mannitol
Max distance for signal	20 ft	33 ft		20 ft	33 ft		20 ft	24.9 ft, on body vibration alerts

Slide 14

DI1 updated
Diana Isaacs, 2026-04-10T02:09:54.094

Poll Question 12

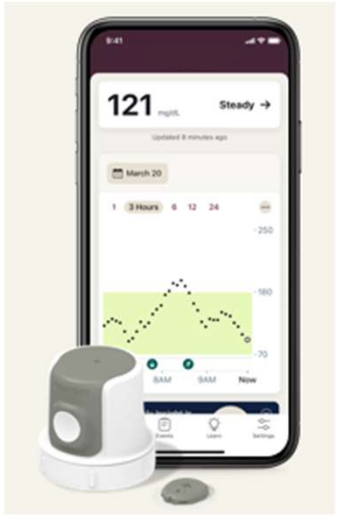
Which of the following sensors is sold over the counter without a prescription?

A. Simplera Sync
B. Dexcom G7
C. Libre 3
D. Dexcom Stelo

DI1

Over-The-Counter CGM

- Available without a prescription
- Ordered online
- Intended for adults not taking insulin
- No alerts for hypoglycemia
- Works with mobile apps that incorporate education on lifestyle and glucose goals



Zahalka SJ, et al. Endocr Pract. 2025 May 21:S1530-891X(25)00893-6

Slide 16

DI1 New slide

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DI1

OTC CGM Options

	Dexcom Stelo	**Abbott Lingo**
Intended audience	Adults not on insulin with T2D, prediabetes, or who are interested in tracking their glucose	Adults not on insulin interested in understanding how to improve their metabolic health
Wear time	15.5 days	14 days
Ability to share data	Dexcom Clarity	No
Glucose range	70-250mg/dL	55-200mg/dL
Real-time alerts	Spike detection	No
Special features	"Spike Alerts" – notified that your glucose is rising at a rate the app determines to be a "Spike" Daily insights	Lingo Count – points assigned for elevations in glucose throughout the day, goal is to get fewer total points, Coaching program
Frequency of glucose readings	15 minutes	1 minute
Education within App	Yes	Yes
Age	≥ 18 yr	≥ 18 yr
Cost	$99/month or $85-$89/month with subscription plans	$49-1 sensor, $89-2 sensors, $249-6 sensors, subscription plan

Information from manufacturers websites: https://www.stelo.com/en-us, Lingo - Made by Abbott: Your body has the answers (hellolingo.com)

Slide 17

DI1 New slide
Diana Isaacs, 2025-08-26T01:19:34.950

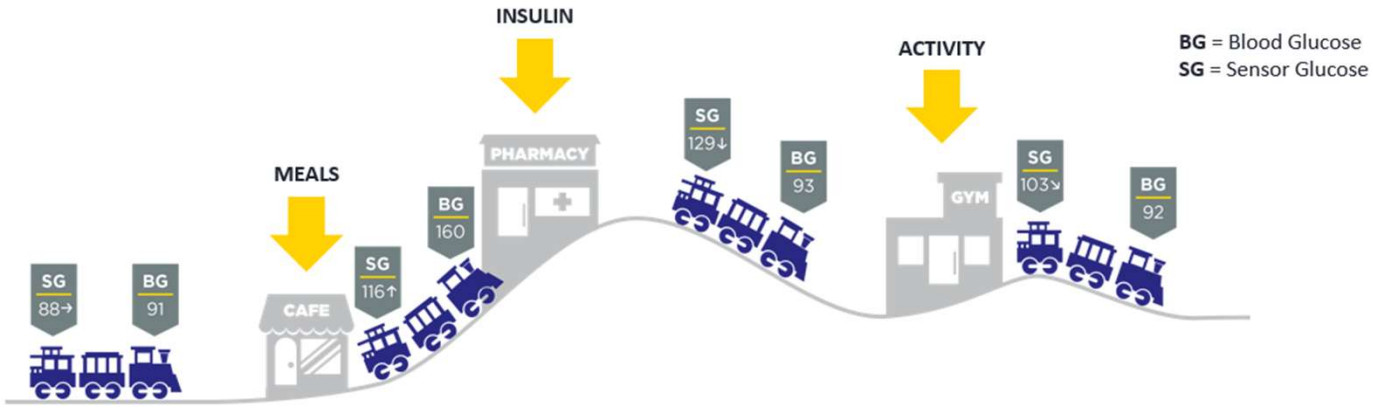
DI1 0 Removed libre rio
Diana Isaacs, 2026-04-10T02:10:18.251

CGM Counseling Points

- Important to check glucose when indicated
  - Symptoms do not match sensor value
  - During warm-up period for treatment decisions
- Sensors are waterproof
  - Showering, bathing, swimming OK
  - Check water depth criteria for individual sensor
- Overlays and skin preps to help it stay on
- Avoid with MRI, CT, diathermy
  - Exception: Eversense implantable, transmitter should be removed
  - Libre now ok for MRI/CT
- Not FDA approved
  - Dialysis, critically ill
  - Pregnancy-Guardian,simplera eversense, G6
  - If people choose to use, it is important they know it is off-label

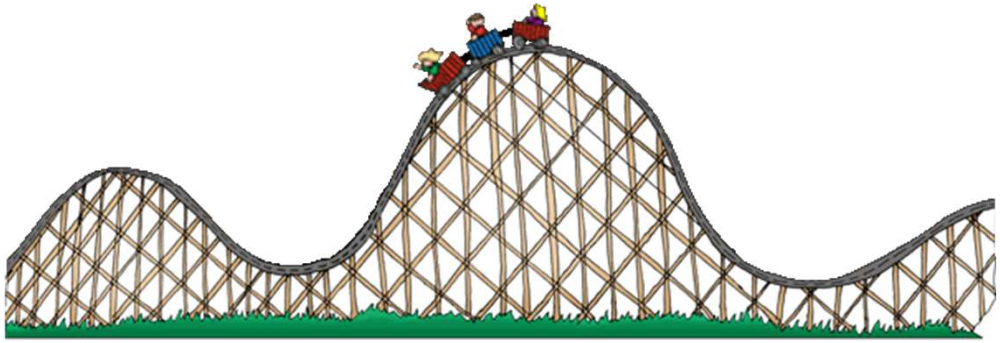
Lag Time

- Refers to a slight delay in CGM sensor readings compared to finger sticks
- Most apparent when glucose is changing rapidly
- Counsel pwd on the train analogy



Lag Time

- Refers to a delay in CGM sensor readings compared to finger stick blood glucose readings
  - Estimated CGM sensor reading ~5 minutes behind
- Most apparent when glucose is changing rapidly
- Counsel patients on the train analogy



Causes of Falsely High or Low Readings

- Interfering substances
  - Falsely high
    - Vitamin C (Libre)
    - Acetaminophen (high dose Dexcom, Simplera)
    - Tetracycline antibiotics (Eversense)
- Compression Lows
- Dehydration
- Faulty sensor

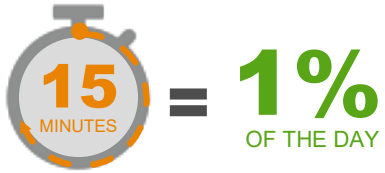
When to Check BGM?

- A calibration or blood glucose symbol appears on the device
  - If making a dosing decisions
- Symptoms or expectations do not match CGM readings
- Off-label indications to ensure accuracy: dialysis, inpatient use
- Possibly after correcting a low
- If taking an interfering substance
- Counsel pwd about “lag time”

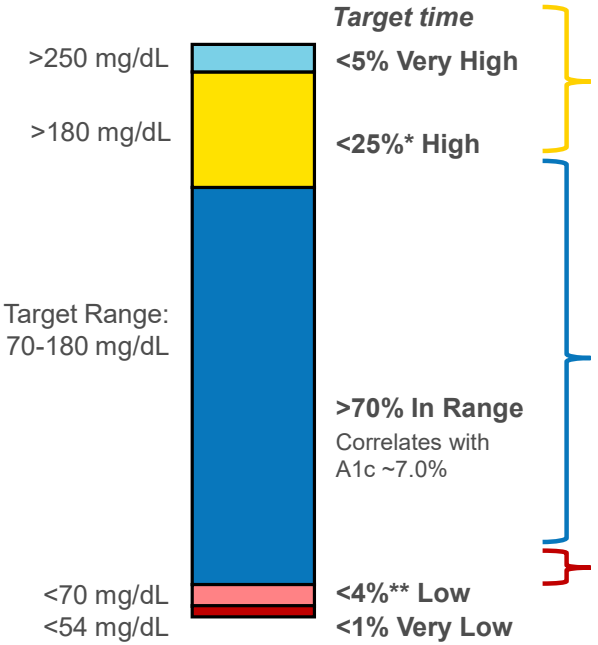
Per ADA, every person using CGM should have access to a meter and test strips

Downloading CGM Data

CGM Key Metrics



Recommended Time in Range for most people with T1D & T2D



Time above range (TAR)
< 1 hr, 12 min, > 250 mg/dL
< 6 hr, > 180 mg/dL

Time in range (TIR)
> 16 hr, 48 min

Time below range (TBR)
< 1hr < 70mg/dL
< 15 min < 54mg/dL

Number of days CGM is worn 14 days is recommended
Percentage of time CGM is active 70% of data from 14 days is recommended
Mean glucose
Glucose management indicator (GMI) Estimated A1C
Coefficient of variation (CV) This is a measure of glycemic variability. A CV >36% is considered unstable.

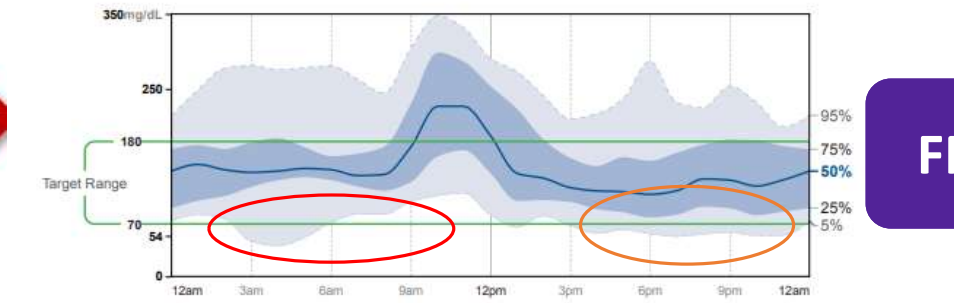
1. Battelino T et al. *Diabetes Care*. 2019;42(8):1593-1603. . 2. American Diabetes Association. *Diabetes Care 2021;44(Suppl. 1):S73–S84 | https://doi.org/10.2337/dc21-S006.*

AGP report

Metrics and targets

More Green, Less Red

AGP profile (14 days)

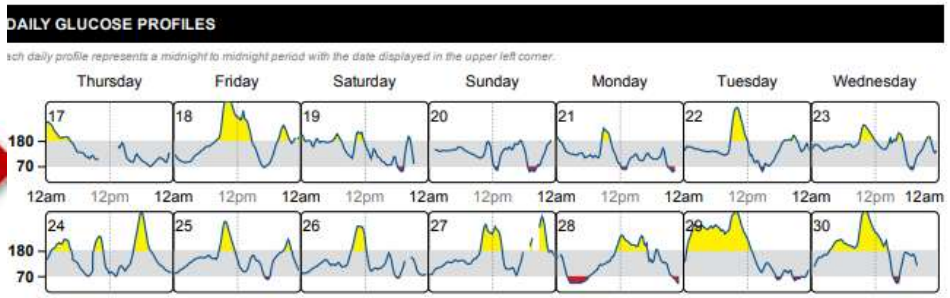


FNIR

Flat Narrow In Range

Treat Hypo 1st

Daily views



Patterns

Poll 17. What is the goal time in range for most adults with type 1 or 2 diabetes?

A. ≥50%

B. ≥70%

C. ≥80%

D. ≥90%

Target Glucose Ranges

Day

Start Time: 6:00 AM
End Time: 10:00 PM
Low Threshold: 70 mg/dL
High Threshold: 180 mg/dL

Night

Start Time: 10:00 PM
End Time: 6:00 AM
Low Threshold: 70 mg/dL
High Threshold: 180 mg/dL

Time in Range

3% Very High
22% High
73% In Range
2% Low
0% Very Low

Target Range:
70-180 mg/dL

Day

Start Time: 6:00 AM
End Time: 10:00 PM
Low Threshold: 70 mg/dL
High Threshold: 130 mg/dL

Night

Start Time: 10:00 PM
End Time: 6:00 AM
Low Threshold: 70 mg/dL
High Threshold: 130 mg/dL

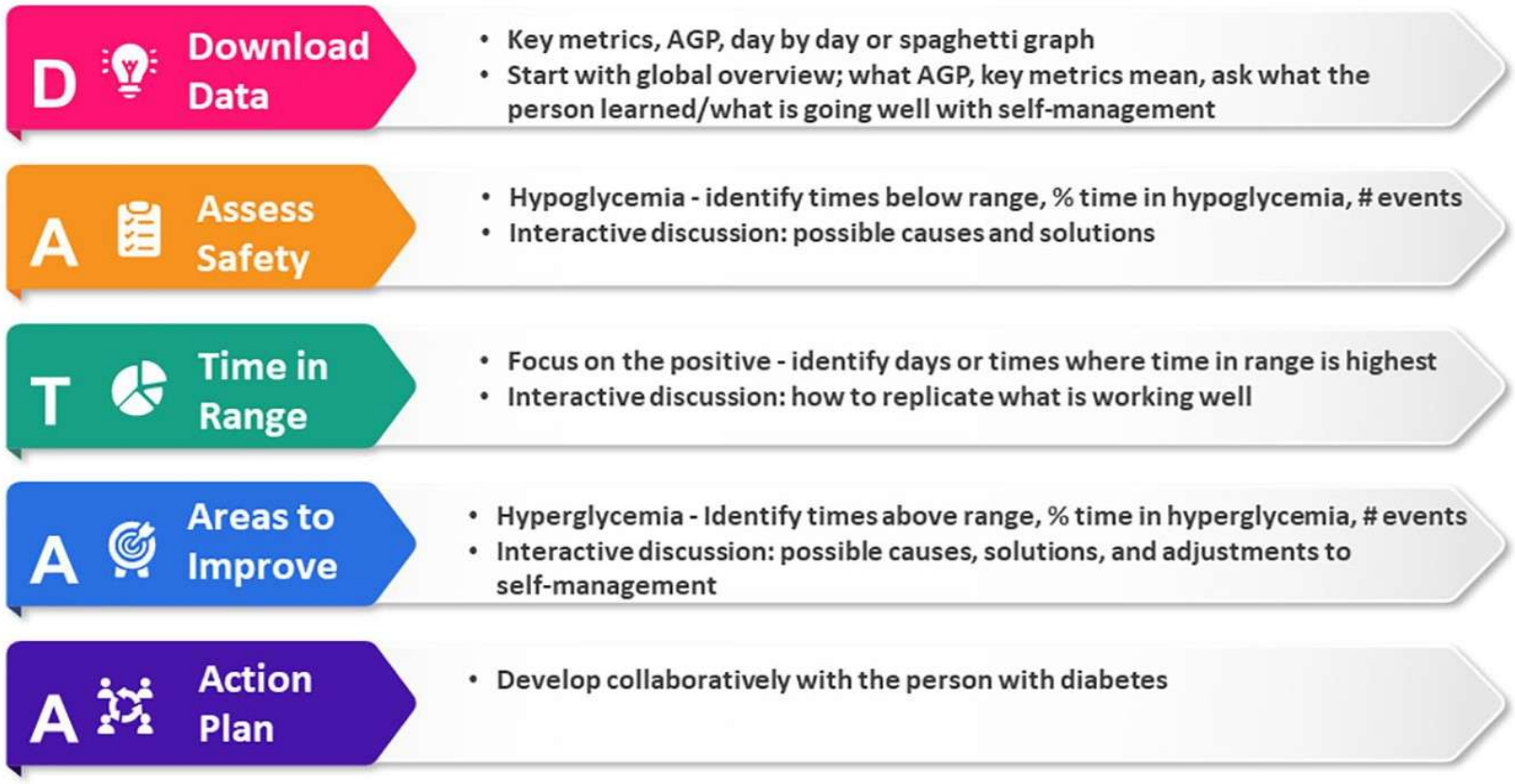
Time in Range

2% Very High
64% High
32% In Range
2% Low
0% Very Low

Target Range:
70-130 mg/dL

Same person, same data, look at the difference in time in range!

Review of CGM - DATAA

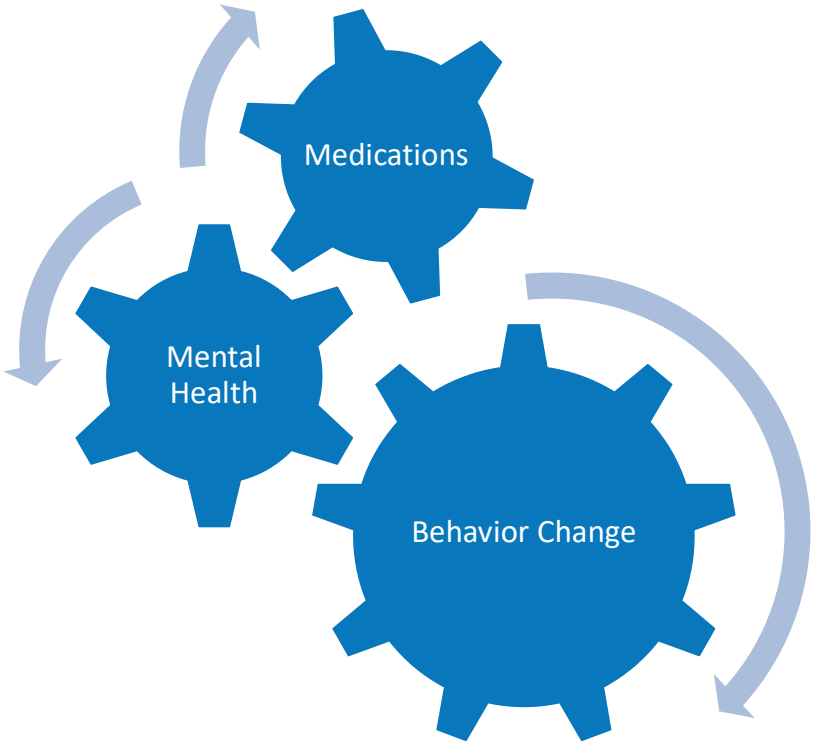


At each step, express that this is information, not good or bad

Isaacs D, Cox C, Schwab K, et al. Technology Integration: The Role of the Diabetes Care and Education Specialist in Practice. The Diabetes Educator. 2020;46(4):323-334. doi:10.1177/0145721720935123

Tips for DATA Interpretation

- Start by asking the person what they've experienced and noticed with their glucose patterns
- Avoid judgment
- Learn from 1 time episodes, but make changes based on patterns
- Fix lows first but some amount is expected (<1-4%) and if you remove all lows, you may end up with too many highs
- If it's not making sense, dig deeper (ex. missed doses, rationing, injection technique, food insecurity, etc)



Case Studies & 2 min Stretch

Case 1

Terrance is a 60-year-old man with T2D x 12 years

Current DM2 meds:

- Metformin 1000 mg twice daily
- Glimepiride 8mg daily

Other conditions

- CKD
- Hyperlipidemia
- Hypertension

Checks BGM once daily

Pertinent Labs

- SCr = 1.38 mg/dL, eGFR = 55
- A1C = 8.2%, BMI = 34 kg/m^2

- Works in project management
- Eats 3 meals/day, snacks at night, no regular exercise
- Glucose log

Day	FBG, mg/dL
1	125
2	123
3	110
4	108
5	99
6	81
7	134

Starts CGM

D Download Data

A Assess Safety

- Which CGM key metrics are at goal?
- Which are not?
- Overall patterns?

GLUCOSE STATISTICS AND TARGETS

February 26, 2021 - March 25, 2021	**28 Days**
% Time CGM is Active	**98%**

Ranges And Targets For	Type 1 or Type 2 Diabetes
Glucose Ranges	**Targets** % of Readings (Time/Day)
Target Range 70-180 mg/dL	Greater than 70% (16h 48min)
Below 70 mg/dL	Less than 4% (58min)
Below 54 mg/dL	Less than 1% (14min)
Above 180 mg/dL	Less than 25% (6h)
Above 250 mg/dL	Less than 5% (1h 12min)

Each 5% increase in time in range (70-180 mg/dL) is clinically beneficial.

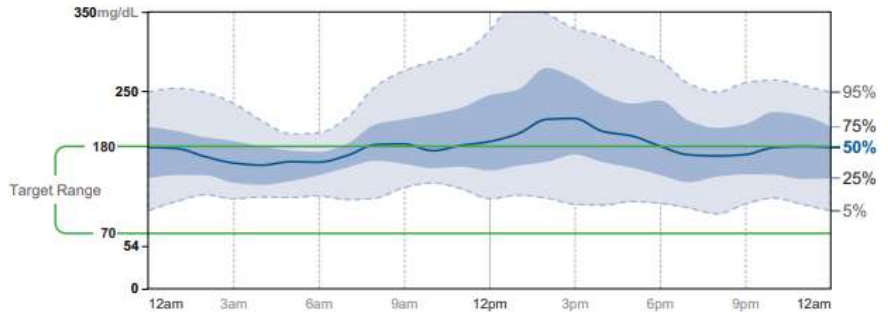
Average Glucose	**185** mg/dL
Glucose Management Indicator (GMI)	**7.7%**
Glucose Variability	**29.7%**

Defined as percent coefficient of variation (%CV); target ≤36%

TIME IN RANGES

AMBULATORY GLUCOSE PROFILE (AGP)

AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if occuring in a single day.



Poll Question 18

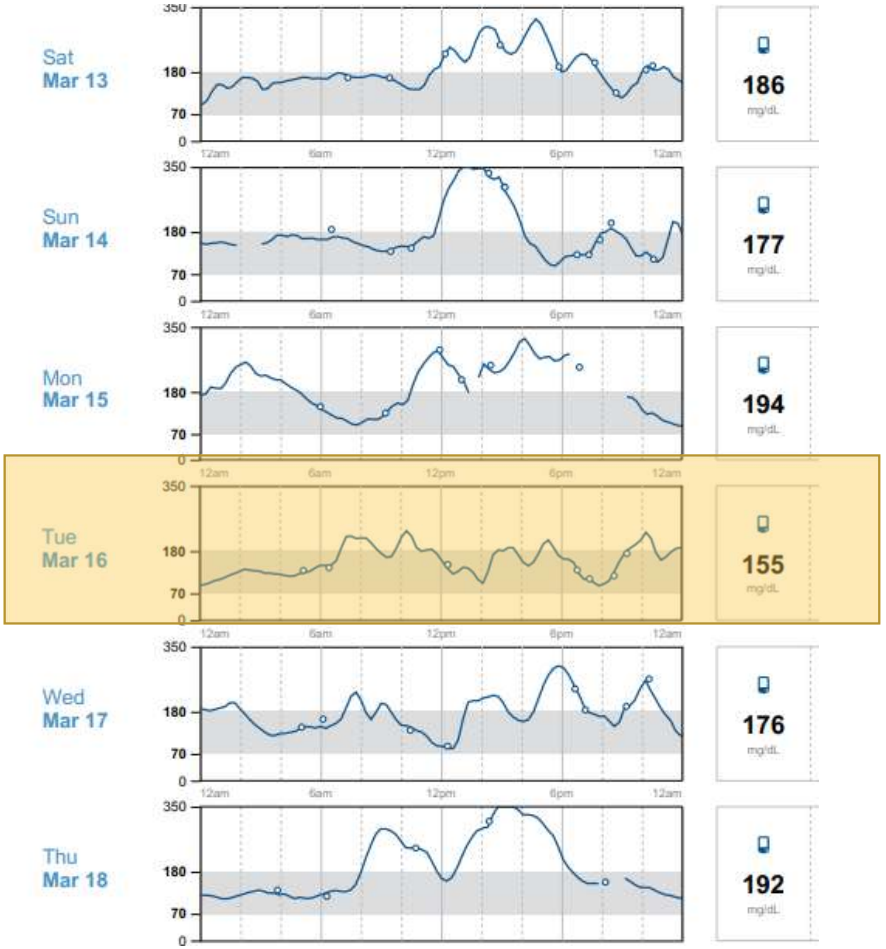
Which CGM key metrics are at goal?

A. Time in range
B. Time above range
C. Time below range
D. Glucose management indicator

Time in Range

Time in Range

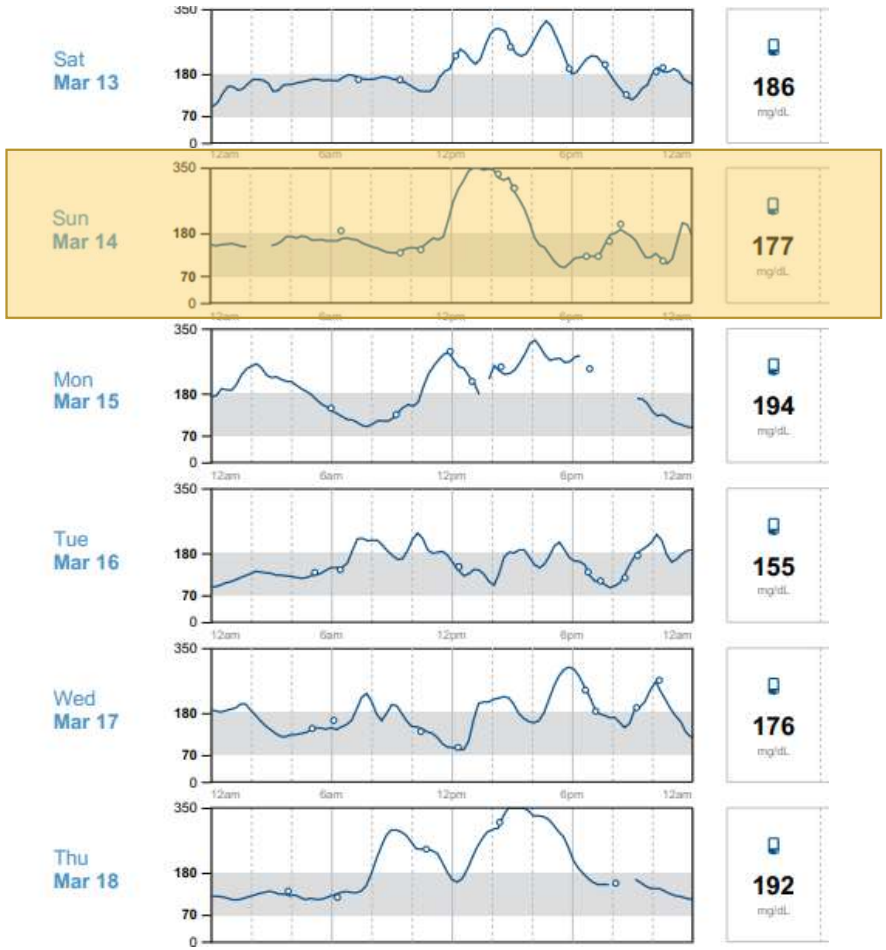
- Focus on the positive: what's worked well on Tue 3/16?
- Time in range is high this day
- Ate a granola bar for breakfast, grilled chicken salad at lunch, steak, greens, potato at dinner
- No missed medication doses
- Good night's sleep, low stress



Areas for Improvement

Areas to Improve

- Sun 3/14 glucose went high 12 pm
- Reports eating rice bowl and coke
- Silver lining
  - Walked around 3 pm (helped to lower glucose)
  - Avoided afternoon snacking
  - Ate low-carb dinner (salmon, salad, small potato)
  - Denies missed doses



DI1

Poll Question 19

What is the most appropriate medication adjustment for Terrance?

A. Add DPP4 inhibitor
B. Add GLP-1 receptor agonist
C. Add SGLT2 inhibitor
D. Lifestyle modifications only
E. More than 1 right answer

Slide 36

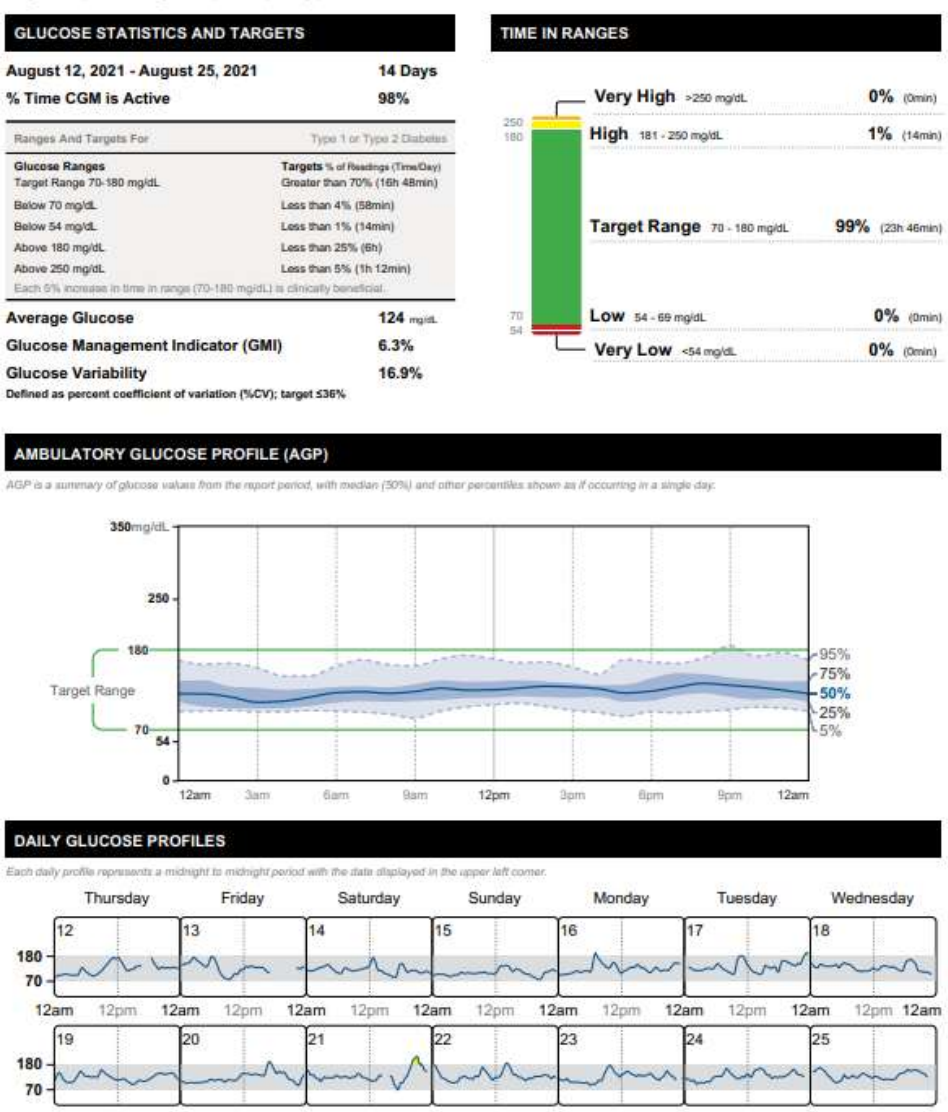
DI1 Updated, best answer is E.
Diana Isaacs, 2025-08-26T01:25:37.190

Action Plan

- In collaboration with Terrance
  - Lifestyle changes
    - Incorporate a brisk walk 3 days per week
    - Reduce high-carbohydrate foods like fries
  - CGM optimization
    - Alerts, high for 280
  - Medication adjustments
    - Add a medication to help his CKD + optimize glucose → SGLT2 inhibitor
  - Follow-up in 3-4 weeks

3 Months Later

T2D Meds:
Empagliflozin 10mg qday
Metformin 1000mg BID



GLUCOSE STATISTICS AND TARGETS

August 12, 2021 - August 25, 2021	14 Days
% Time CGM is Active	98%

Ranges And Targets For	Type 1 or Type 2 Diabetes
Glucose Ranges	**Targets** % of Readings (Time/Day)
Target Range 70-180 mg/dL	Greater than 70% (16h 48min)
Below 70 mg/dL	Less than 4% (58min)
Below 54 mg/dL	Less than 1% (14min)
Above 180 mg/dL	Less than 25% (6h)
Above 250 mg/dL	Less than 5% (1h 12min)

Each 5% increase in time in range (70-180 mg/dL) is clinically beneficial.

Average Glucose	124 mg/dL
Glucose Management Indicator (GMI)	6.3%
Glucose Variability	16.9%

Defined as percent coefficient of variation (%CV); target ≤36%

TIME IN RANGES

Very High	>250 mg/dL	0% (0min)
High	181 - 250 mg/dL	1% (14min)
Target Range	70 - 180 mg/dL	99% (23h 46min)
Low	54 - 69 mg/dL	0% (0min)
Very Low	<54 mg/dL	0% (0min)

AMBULATORY GLUCOSE PROFILE (AGP)

AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if occurring in a single day.

DAILY GLUCOSE PROFILES

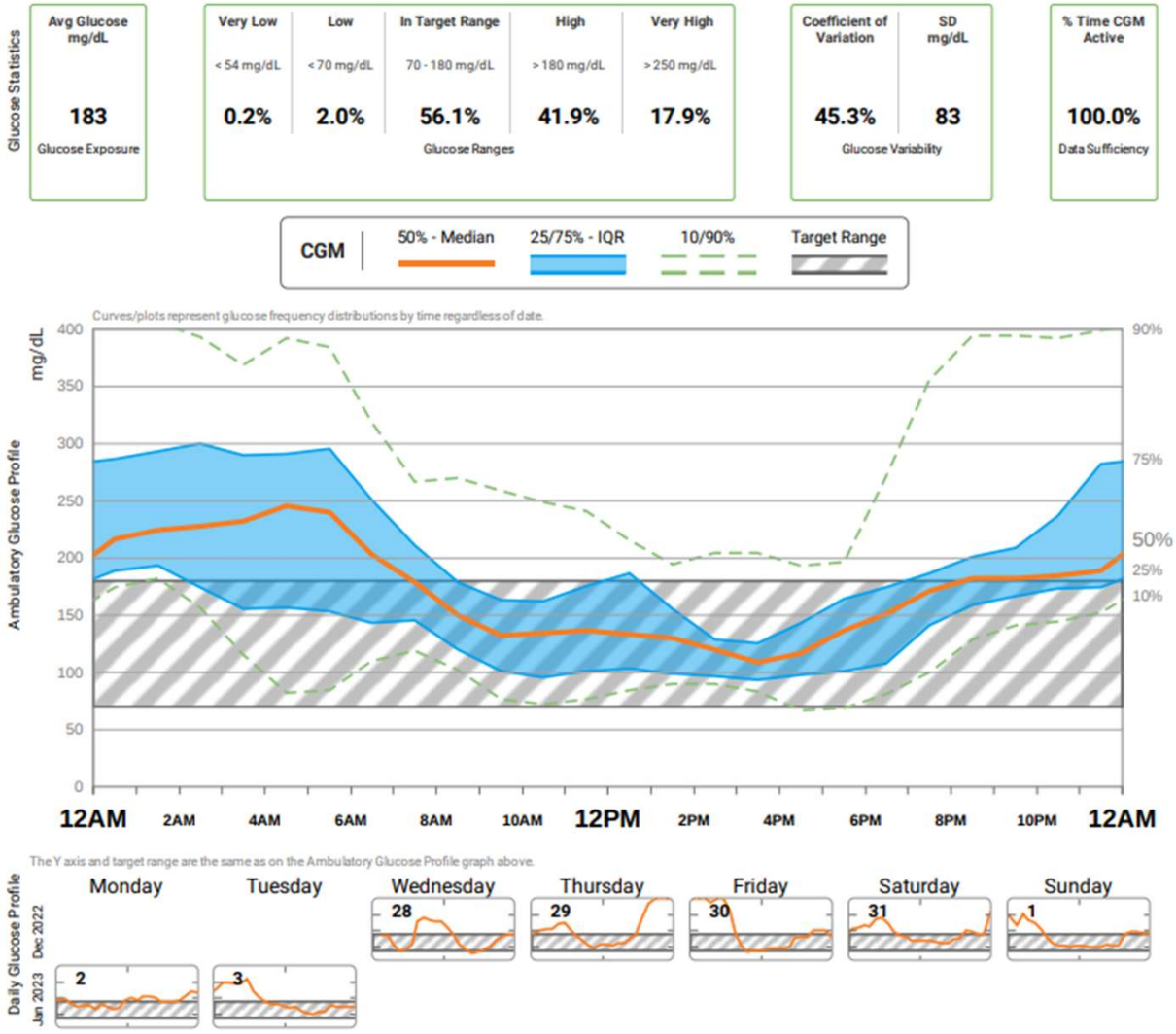
Each daily profile represents a midnight to midnight period with the date displayed in the upper left corner.

Case 2

75 yo F with 25 year h/o T2D. PMH includes HTN, hyperlipidemia, hypothyroid, obesity, ASCVD.

Current DM Meds

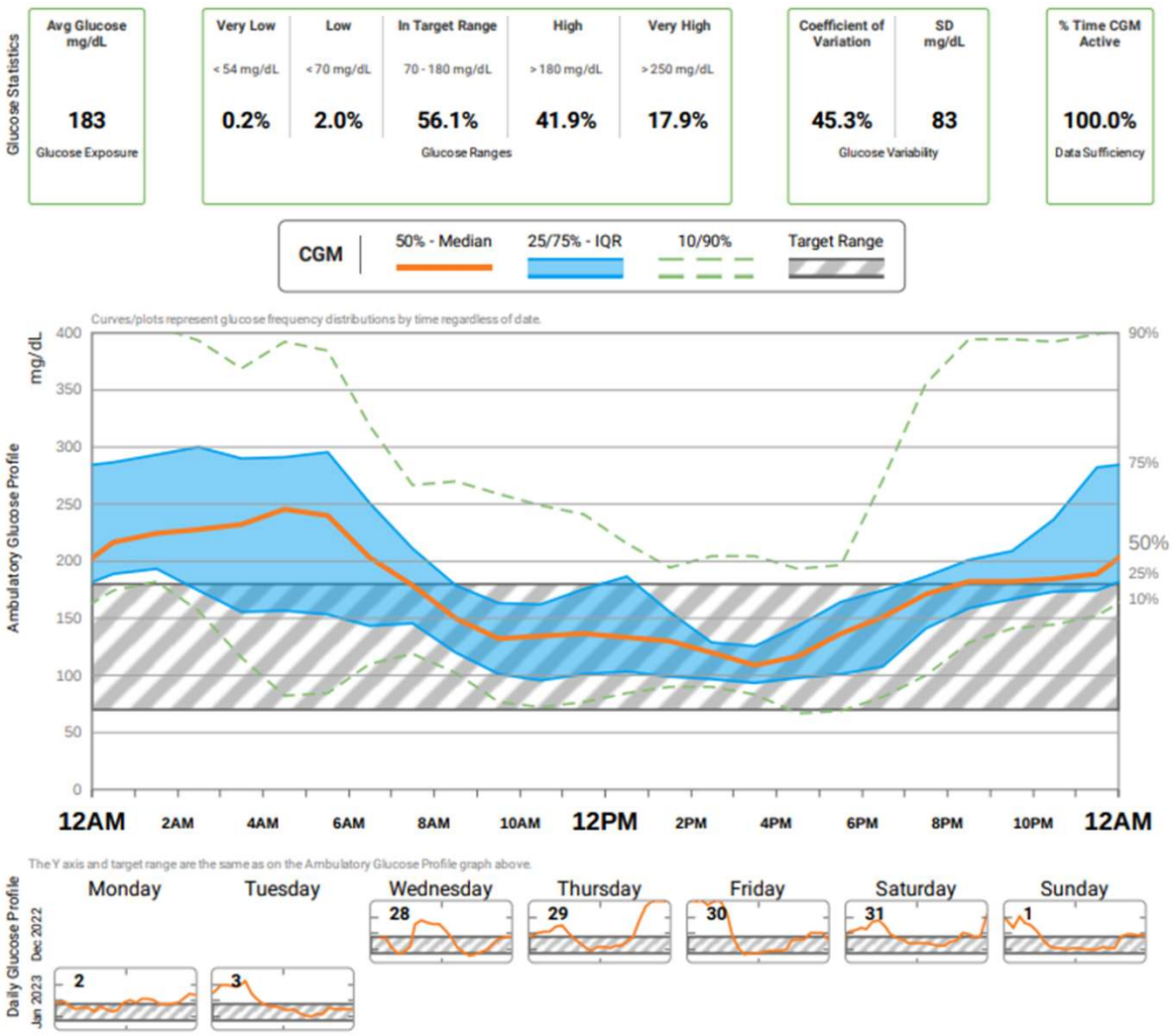
-Insulin glargine inject 50 units QAM and 40 at night
-Insulin aspart 8-10-10 units plus correction scale
-Metformin 1000 mg daily
-Semaglutide, 0.25mg weekly (2 doses so far)



Clarity report obtained from Diana Isaacs

Poll 20. Which of the following CGM key metrics is at target?

A. Time in range
B. Time above range
C. Coefficient of variation
D. Time below range



Clarity report obtained from Diana Isaacs

Using DATAA

A Assess Safety

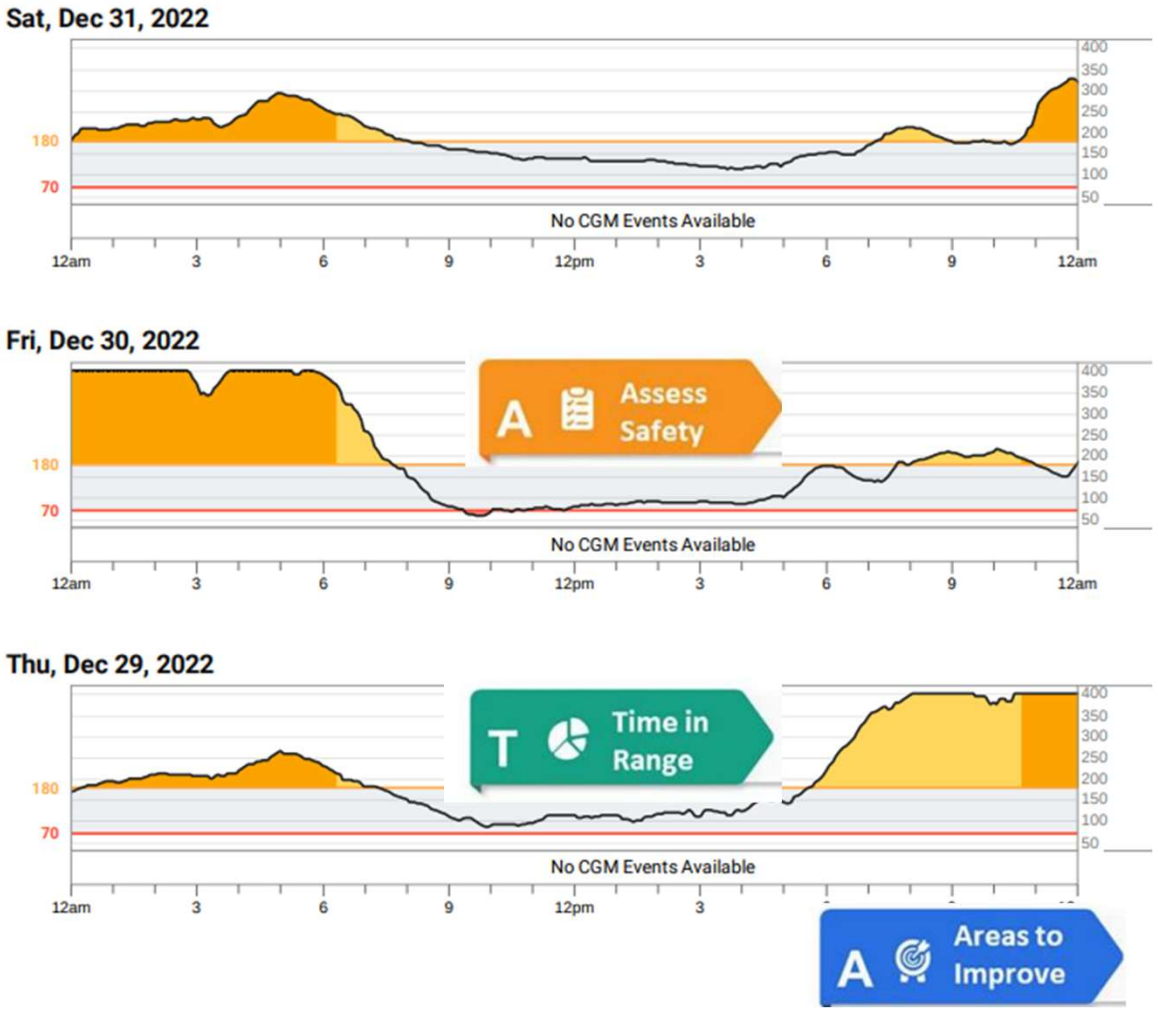
Less of an appetite since taking semaglutide, often going low during the day

T Time in Range

During the day, glucose often steady, but also having to drink juice to keep from going low

A Areas to Improve

Skipping aspart doses because running low, leading to rebound highs



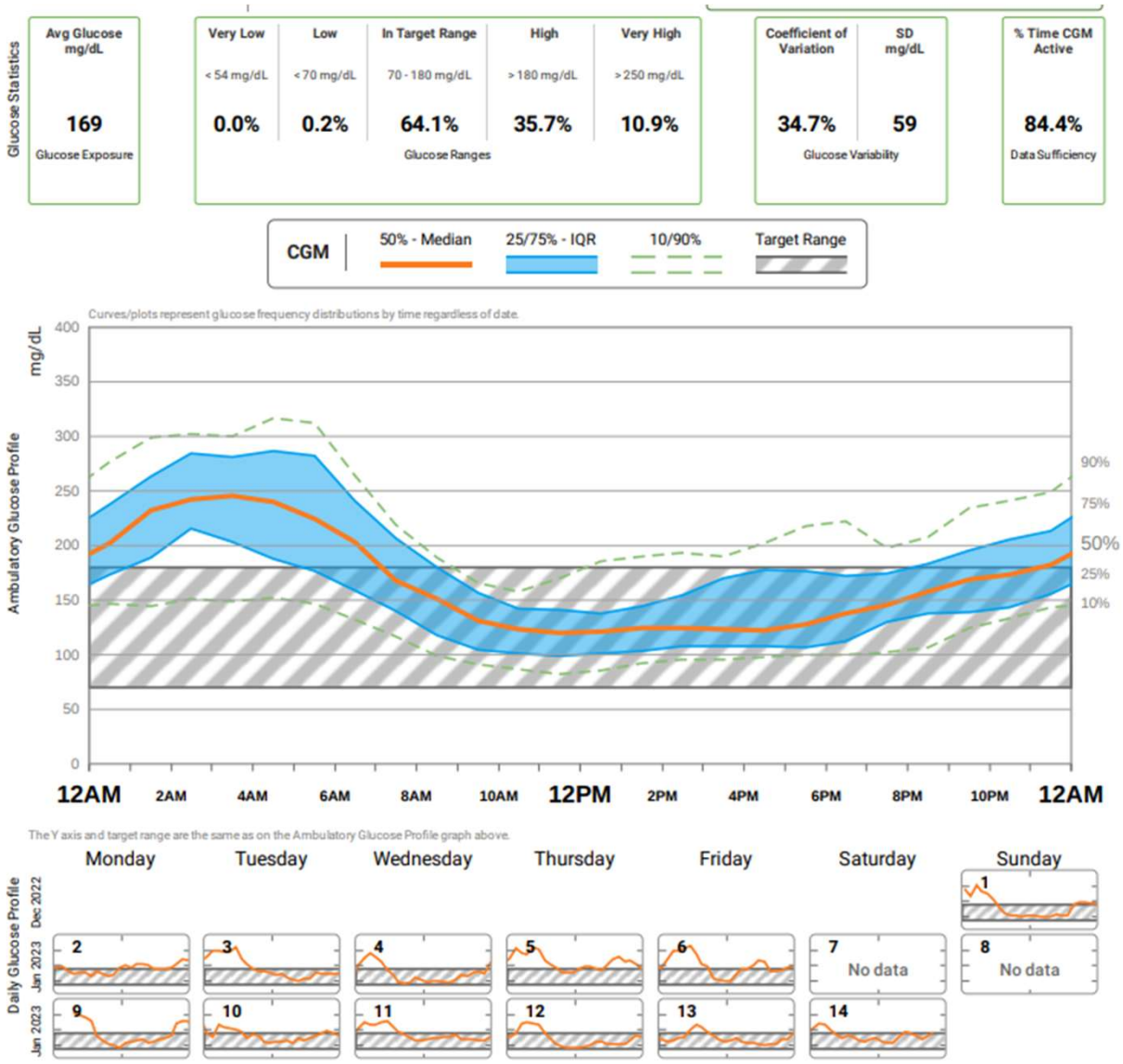
Clarity report obtained from Diana Isaacs

Action Plan

- Continue semaglutide 0.25mg weekly x 2 more weeks, then titrate up to 0.5mg weekly
- Decrease insulin glargine to 45 units qam and 35 units qpm
- Continue insulin aspart 8-10-10 + correction scale
- Continue metformin 1000mg daily

1 month later

- Average glucose improved
- Time in range increased
- Glucose variability improved
- Less hypoglycemia

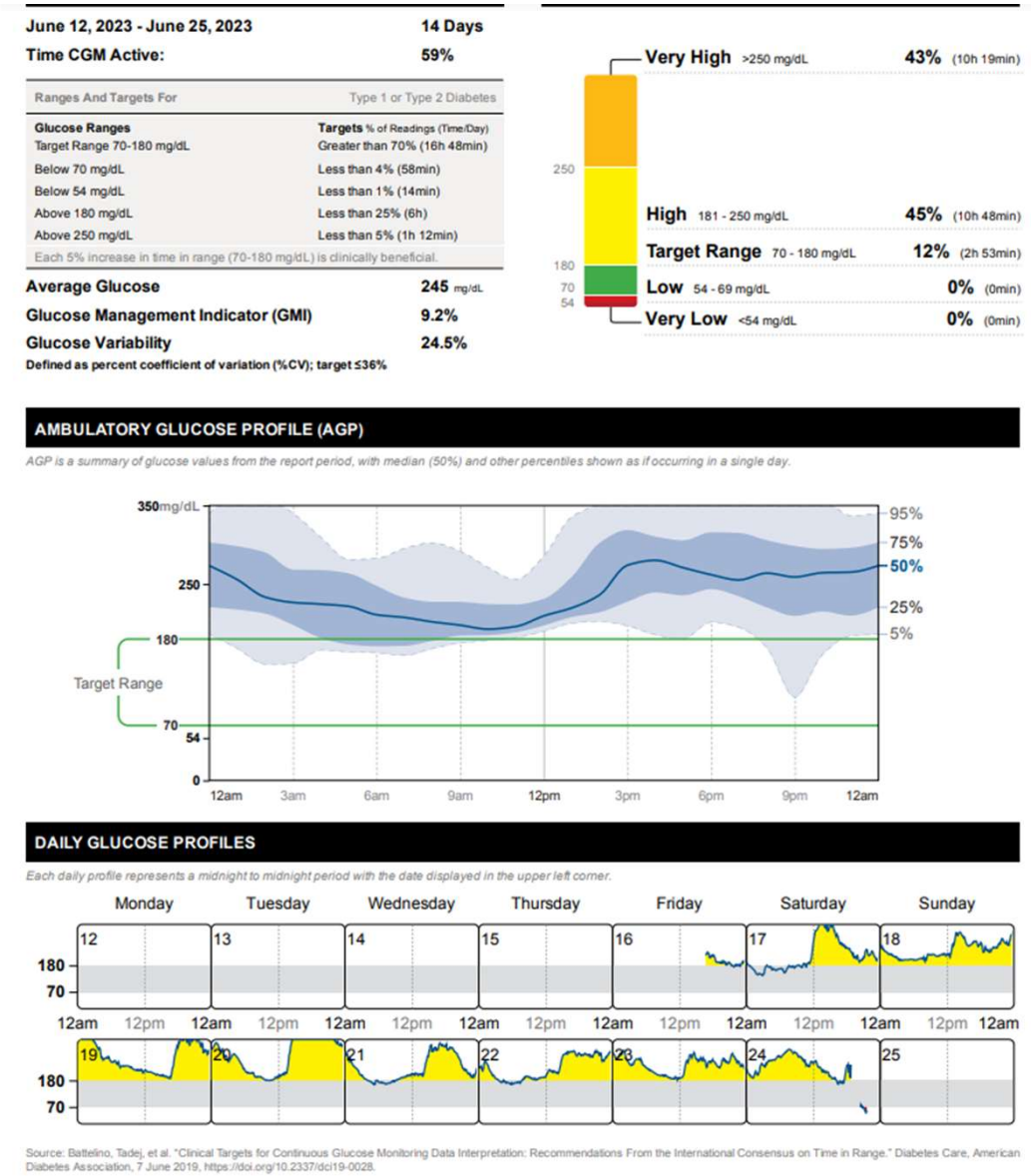


Clarity report obtained from Diana Isaacs

Case 3

- Person with T2D taking metformin 1000mg twice daily and insulin glargine 20 units daily

Is TIR at goal?
What to ask?
What changes to make?



June 12, 2023 - June 25, 2023	14 Days
Time CGM Active:	59%

Ranges And Targets For	Type 1 or Type 2 Diabetes
Glucose Ranges	**Targets** % of Readings (Time/Day)
Target Range 70-180 mg/dL	Greater than 70% (16h 48min)
Below 70 mg/dL	Less than 4% (58min)
Below 54 mg/dL	Less than 1% (14min)
Above 180 mg/dL	Less than 25% (6h)
Above 250 mg/dL	Less than 5% (1h 12min)

Each 5% increase in time in range (70-180 mg/dL) is clinically beneficial.

Average Glucose	245 mg/dL
Glucose Management Indicator (GMI)	9.2%
Glucose Variability	24.5%

Defined as percent coefficient of variation (%CV); target ≤36%

Very High	>250 mg/dL	43%	(10h 19min)
High	181 - 250 mg/dL	45%	(10h 48min)
Target Range	70 - 180 mg/dL	12%	(2h 53min)
Low	54 - 69 mg/dL	0%	(0min)
Very Low	<54 mg/dL	0%	(0min)

250 180 70 54

AMBULATORY GLUCOSE PROFILE (AGP)

AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if occurring in a single day.

350mg/dL 250 180 70 54 0 Target Range

95% 75% 50% 25% 5%

12am 3am 6am 9am 12pm 3pm 6pm 9pm 12am

DAILY GLUCOSE PROFILES

Each daily profile represents a midnight to midnight period with the date displayed in the upper left corner.

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

12 13 14 15 16 17 18

180 70

12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am

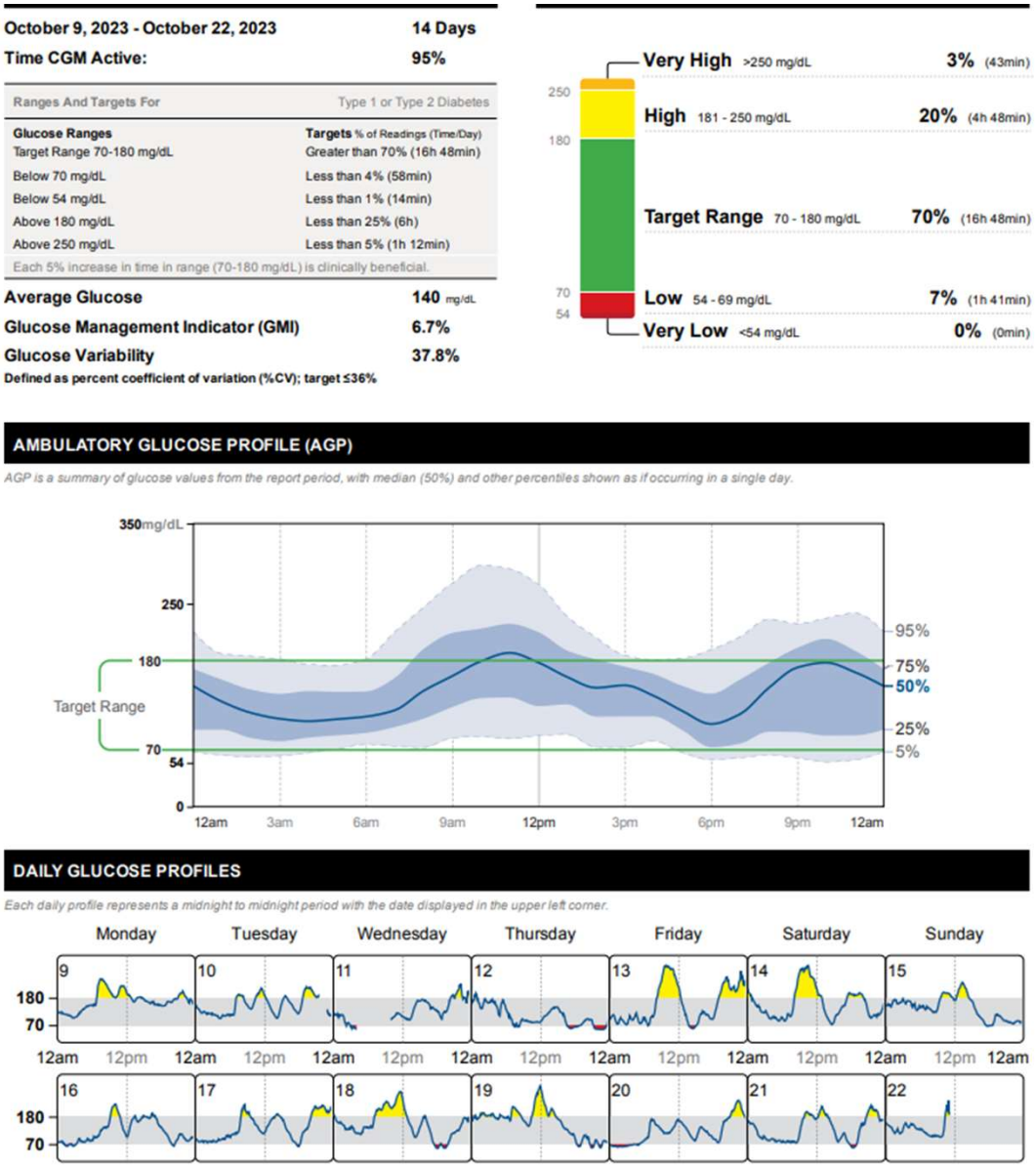
19 20 21 22 23 24 25

180 70

Source: Battelino, Tadej, et al. "Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations From the International Consensus on Time in Range." Diabetes Care, American Diabetes Association, 7 June 2019, https://doi.org/10.2337/dci19-0028.

Case 4

- Person with T2D
- 56yo, BMI=33, A1C=7%
- Meds:
  - Degludec 40 units daily
  - Dulaglutide 4.5mg weekly
  - Dapagliflozin 10mg daily
  - Metformin 1000mg twice daily



October 9, 2023 - October 22, 2023	14 Days
Time CGM Active:	95%

Ranges And Targets For	Type 1 or Type 2 Diabetes
Glucose Ranges	**Targets** % of Readings (Time/Day)
Target Range 70-180 mg/dL	Greater than 70% (16h 48min)
Below 70 mg/dL	Less than 4% (58min)
Below 54 mg/dL	Less than 1% (14min)
Above 180 mg/dL	Less than 25% (6h)
Above 250 mg/dL	Less than 5% (1h 12min)

Each 5% increase in time in range (70-180 mg/dL) is clinically beneficial.

Average Glucose	**140** mg/dL
Glucose Management Indicator (GMI)	**6.7%**
Glucose Variability	**37.8%**

Defined as percent coefficient of variation (%CV); target ≤36%

Very High	>250 mg/dL	**3%** (43min)
High	181 - 250 mg/dL	**20%** (4h 48min)
Target Range	70 - 180 mg/dL	**70%** (16h 48min)
Low	54 - 69 mg/dL	**7%** (1h 41min)
Very Low	<54 mg/dL	**0%** (0min)

250 180 70 54

AMBULATORY GLUCOSE PROFILE (AGP)

AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if occurring in a single day.

350mg/dL 250 180 70 54 0

Target Range

95% 75% 50% 25% 5%

12am 3am 6am 9am 12pm 3pm 6pm 9pm 12am

DAILY GLUCOSE PROFILES

Each daily profile represents a midnight to midnight period with the date displayed in the upper left corner.

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

9 10 11 12 13 14 15

180 70

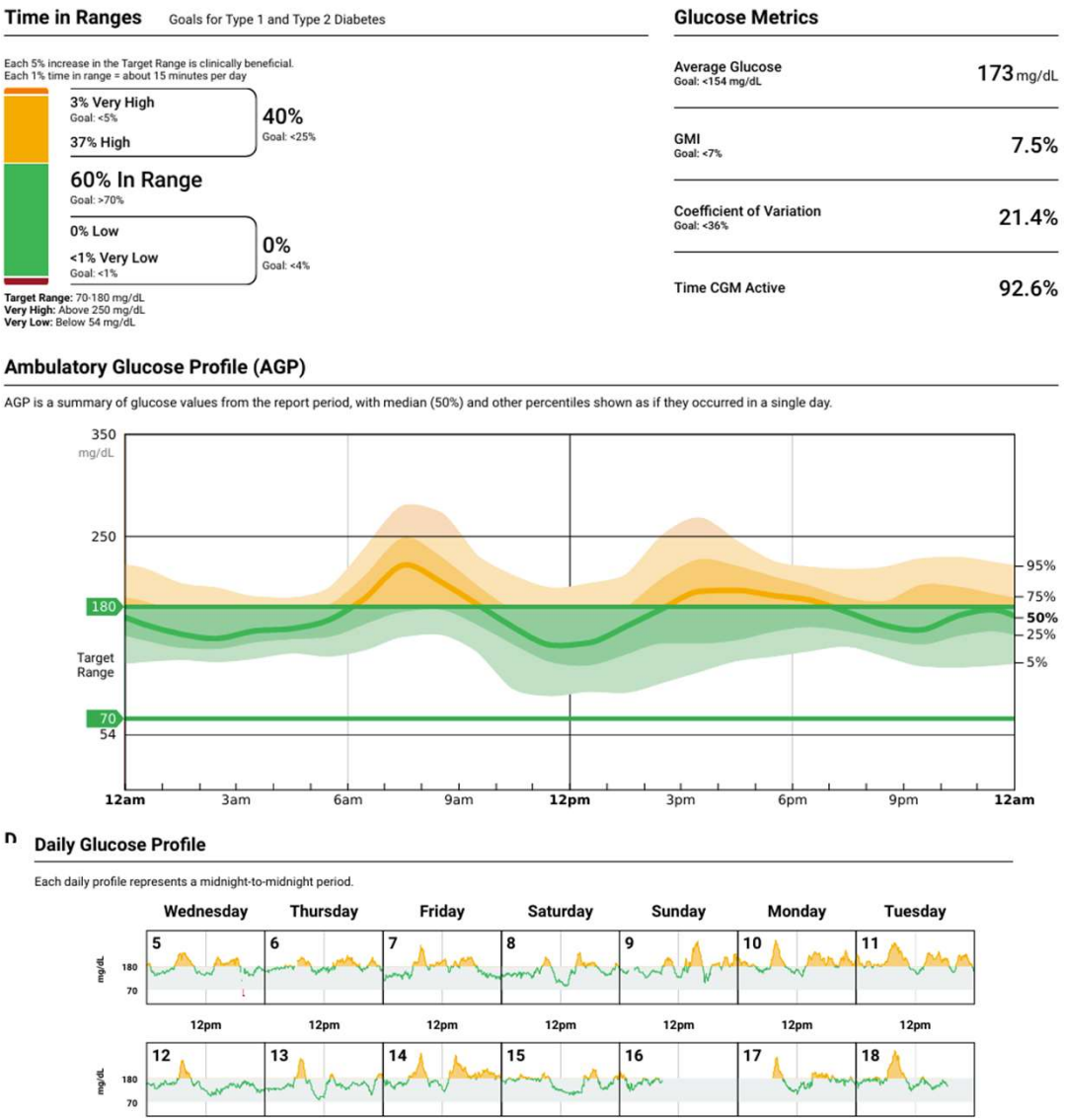
12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am

16 17 18 19 20 21 22

180 70

Case 5

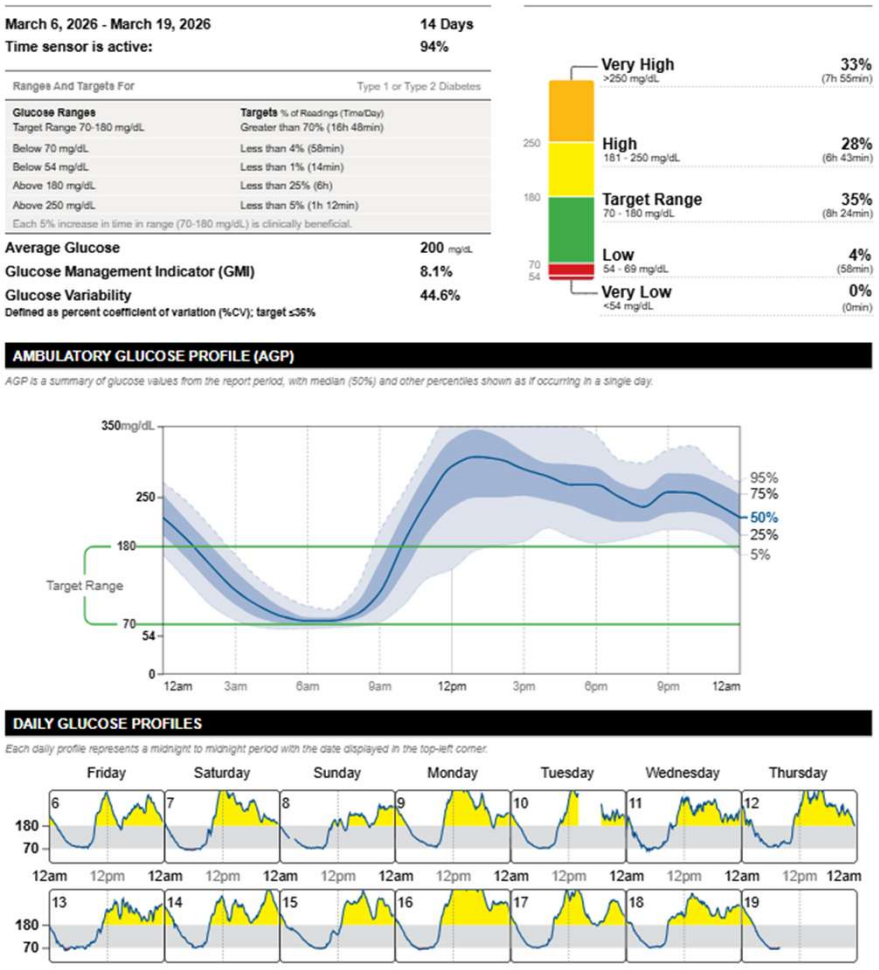
- 40yo F with T2D, lost 20lbs since starting Semaglutide 6 months ago, A1C=7.4%, also has HTN, dyslipidemia, BMI=34kg/m2
- DM Meds:
  - Metformin 1000mg twice daily
  - Empagliflozin 25mg daily
  - Semaglutide 2mg weekly
- Is data at goal?
  - TBR?
  - TIR?
  - TAR?
- Action plan?



Patient Case 6

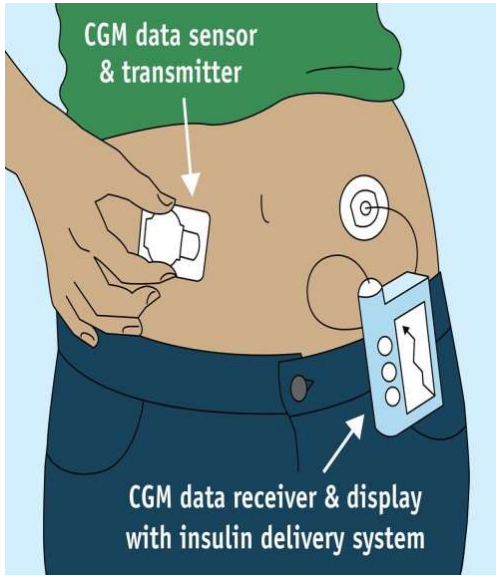
- **72yo with type 2 diabetes**
- **Lispro 6 units three times daily with meals + SS#2**
- **Glargine 12 units daily**
- **Goal: transition to GLP-1**

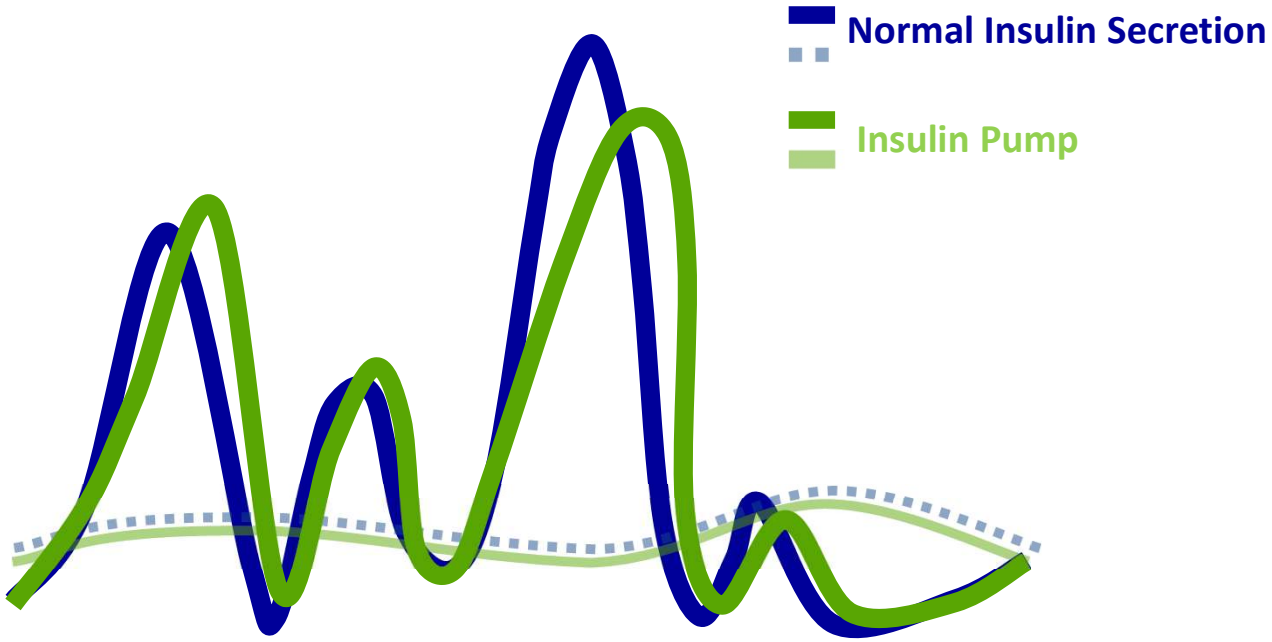
- **DATAA model for interpretation**
  - **Download data**
  - **Assess hypoglycemia**
  - **Time in range: what's working well?**
  - **Areas for improvement**
  - **Action plan**



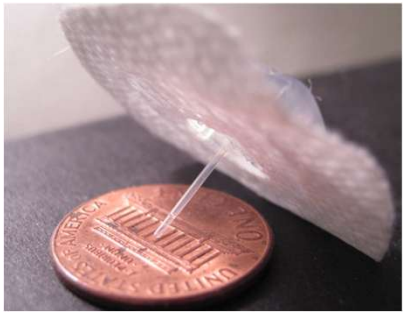
Insulin Pumps

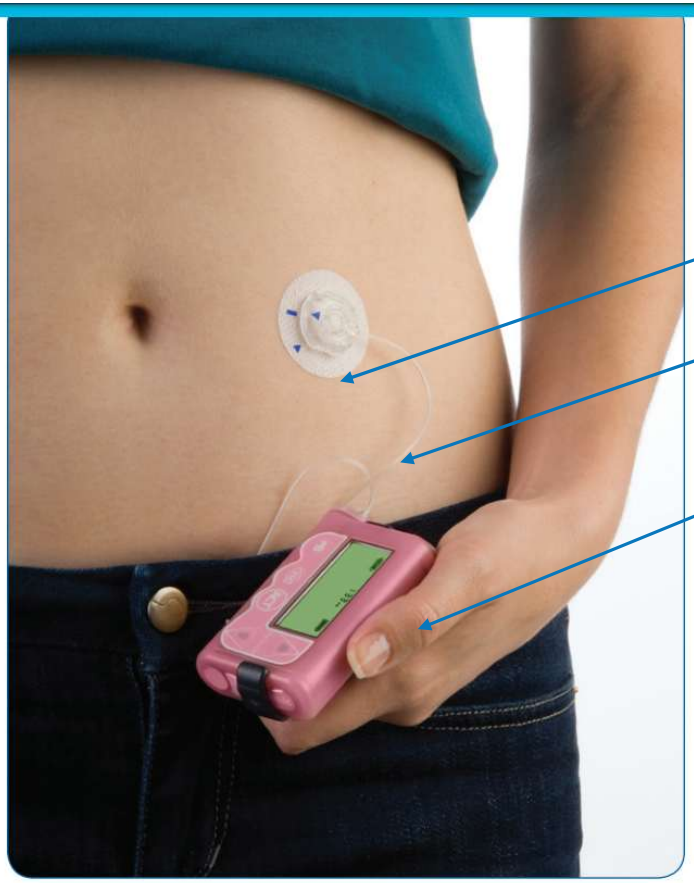
How a Pump Delivers Insulin





Insulin Pump Basics





Infusion Set

Tubing

Pump

Insulin Pump Definitions

Basal rates	Carbohydrate ratios	Correction factors
Glucose targets	Active insulin time	Max bolus/Max basal
Extended boluses	Temp basals	Suspend on/before low

Insulin Pump Info

Uses U100 rapid-acting insulin

- Minimizes insulin variability
- Must have dexterity to fill cartridge or device

Bolus calculator incorporating settings

Active insulin to prevent stacking

Multiple basal rates or automated delivery

Small dose increments

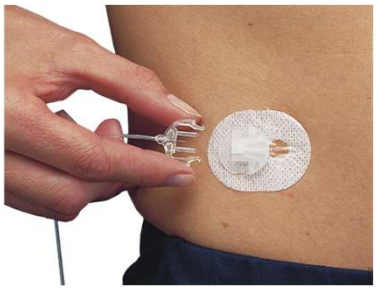
Temporary basal rates or temporary glucose targets

Alarms and reminder features

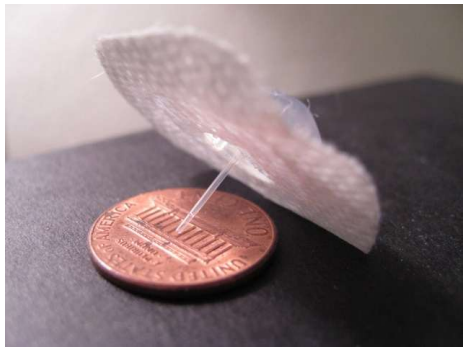
Ideal Pump Candidates

- Require meal-time insulin
- Wearing CGM or frequently checking BGM
- Carbohydrate awareness
- Willing to follow up regularly with health care team
- Can afford the pump/supplies
- Problem solving skills (eg, troubleshoot and treating high or low glucose)
- Able to use the device independently or with caregiver support

Diabetes Care. 2025;48(Supplement_1):S146-S166. doi:10.2337/dc25-S007.



Infusion Sets

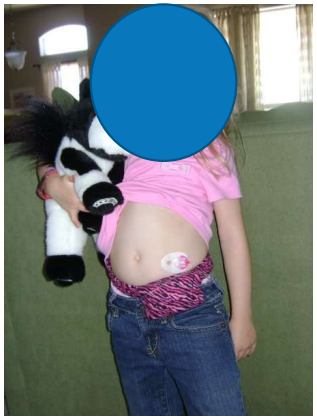


- Infusion sets are usually Teflon
  - Available in different sizes (ex. 9mm vs 6mm)
  - Silhouette (angled) may be better for kids/thinner/very active people
  - Steel infusion sets a good option for people with frequent site occlusions
- Insert at least 1 inch from CGM site
  - Auto-injectors vs. manually injecting
- Site selection/rotation
- Longer tubing options
  - Good if connected on leg, arm or wearing pump further from site
- Caution with kids/babies/pets-pouches available to hide pump
- When changing out infusion set, check glucose or CGM 1-2 hours after
  - Don't change right before bed

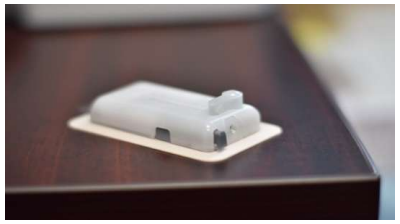
What Happens with a Bent Cannula?

A. Hyperglycemia
B. Hypoglycemia
C. No effect

Where to Wear?



Patch Pumps



Cequr Simplicity

- Bolus pump patch only
- Approved for adults with T1DM or T2DM
- Holds up to 200 units of rapid acting insulin
- On-demand bolus doses in 2 unit increments
- Doses administered via clicks directly on the device
- Must be changed every 4 days

V-Go

- 24 hr. basal/bolus patch pump
- Approved for adults with T2DM
- Allows 20, 30, 40 unit basal rate options
- On-demand bolus doses in 2 unit increments
  - Up to 36 units/24 hrs
- Doses administered via clicks directly on the device
- Must be changed daily

Cequr Simplicity Product Guide: https://myceqursimplicity.com/wp-content/uploads/User-Guide.pdf
V-Go Product Guide: https://www.go-vgo.com/wp-content/uploads/2018/06/instructions-for-patient-use.pdf

Automated Insulin Delivery Systems

Omnipod 5
(Insulet)

T:slim X2 (Tandem)
Control IQ+

780G
(Minimed)

DI1

iLet
(Beta Bionics)

Mobi (Tandem)
Control IQ+

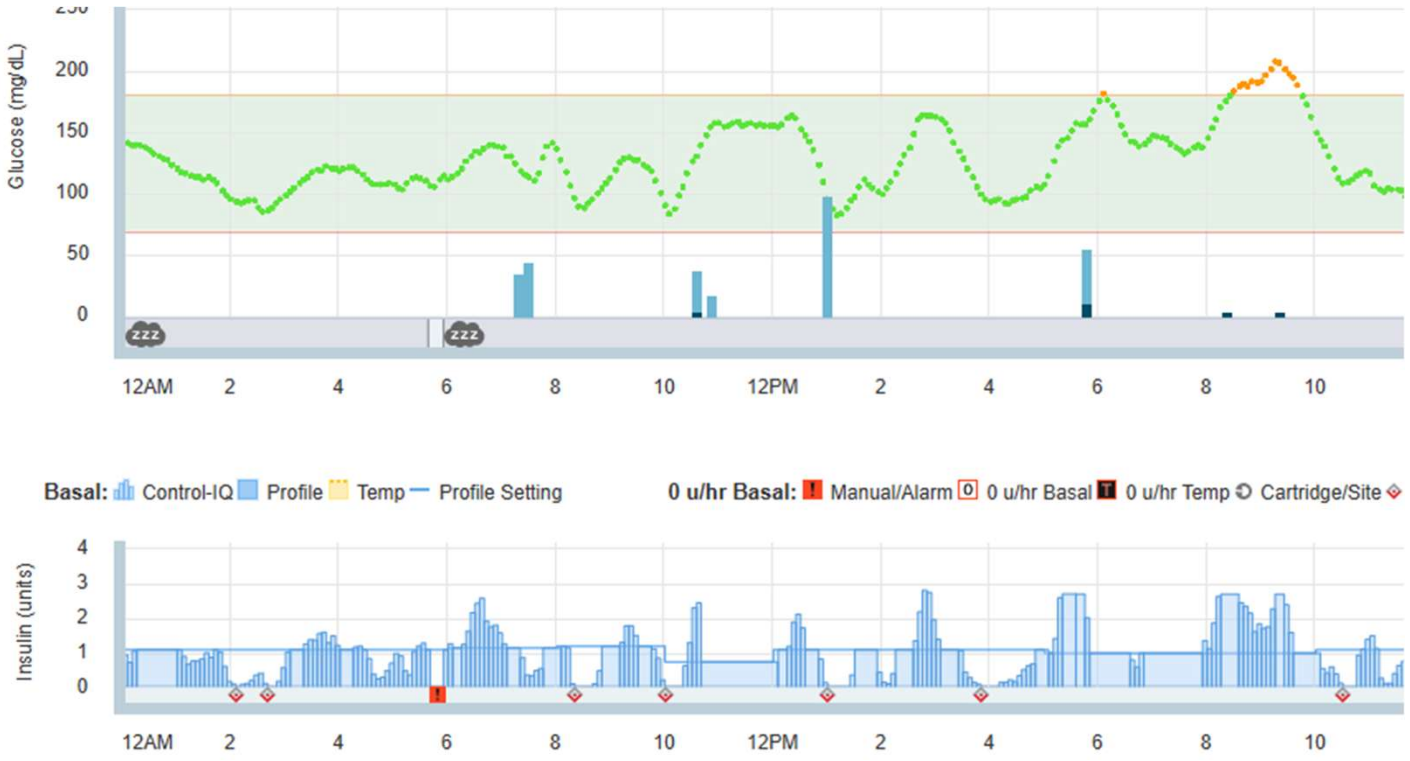
Twiist Loop (Sequel)

Slide 58

DI1 Slight update

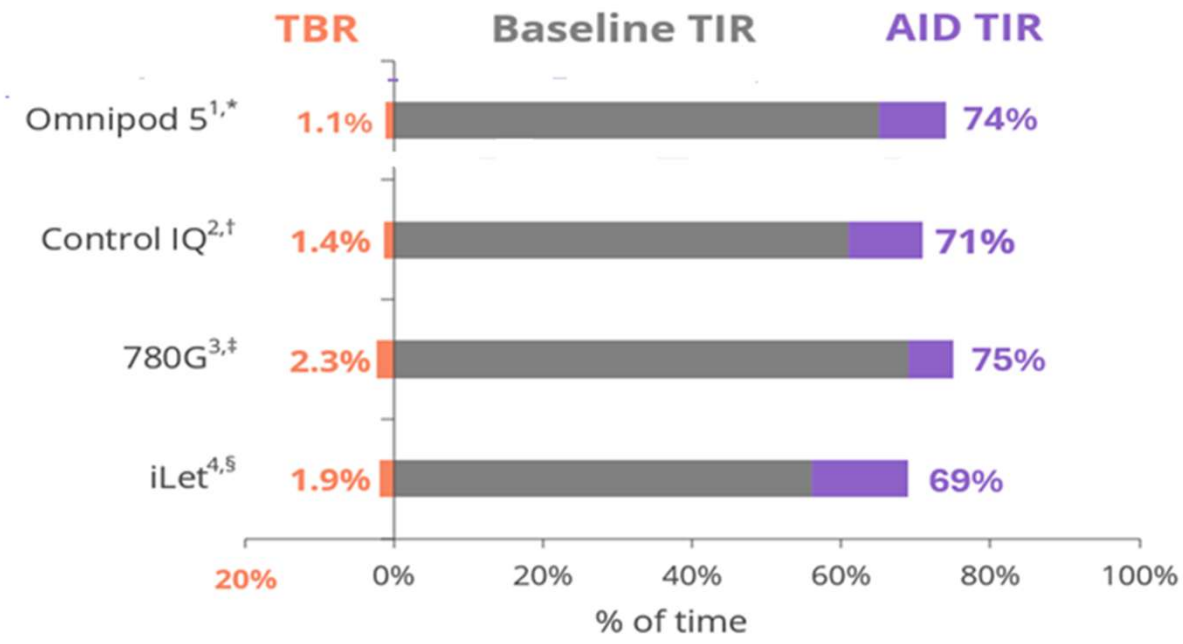
Diana Isaacs, 2025-08-26T01:40:44.900

Hybrid-Closed Loop



- Automated insulin delivery (AID)
- Auto adjust background insulin
- Some systems give auto corrections
- Maximize time 70-180mg/dL

Time in Range From AID Pivotal Trials



DI1

AID increases TIR, reduces hypoglycemia and improves A1C compared to MDI or manual pump therapy

*14-70 years old. †14-17 years old. ‡14-75 years old. §18-79 years old.
TBR, time below range.
1. Brown SA, et al. *Diabetes Care*. 2021;44(7):1630-1640. 2. Brown SA, et al. *N Engl J Med*. 2019;381(18):1707-1717. 3. Carlson AL, et al. *Diabetes Technol Ther*. 2022;24(3):178-189. 4. Kruger D, et al. *Diabetes Technol Ther*. 2022;24(10):697-711.

Slide 60

DI1 New slide

Diana Isaacs, 2026-04-10T10:33:55.387

The Evidence for AID in Type 2 Diabetes DI1

Trial/System	Design	Intervention/ Device	Duration	Baseline glycemic control	Outcomes
SECURE-T2D	Single arm, open label N= 305	Omnipod 5	13 weeks	A1C: 8.2% TIR: 45%	A1C: 7.4% TIR: 66%
2IQP	RCT, open label N= 219	Control IQ+	13 weeks	AID: A1C 8.2%, TIR 48% Control: A1C 8.1%, TIR 51%	A1C: AID 7.3%, Control 7.7%, adjusted difference between groups 0.6% TIR: AID Group: 64%, Control Group 52%
IMPACT2D	Single-arm, open label N= 95	MiniMed 780G	13 weeks	A1C 7.9% TIR: 72%	A1C: 7.2% TIR: 80%

Pasquel, F. et al. *JAMA Netw Open.* 2025;8(2):e2459348; Kudva, Y. et al. *N Egl J Med.* 2025;392:1801-1812; Bhargava, A. et al. *Diabetes Technol Ther.* 2025;27(5):366-375

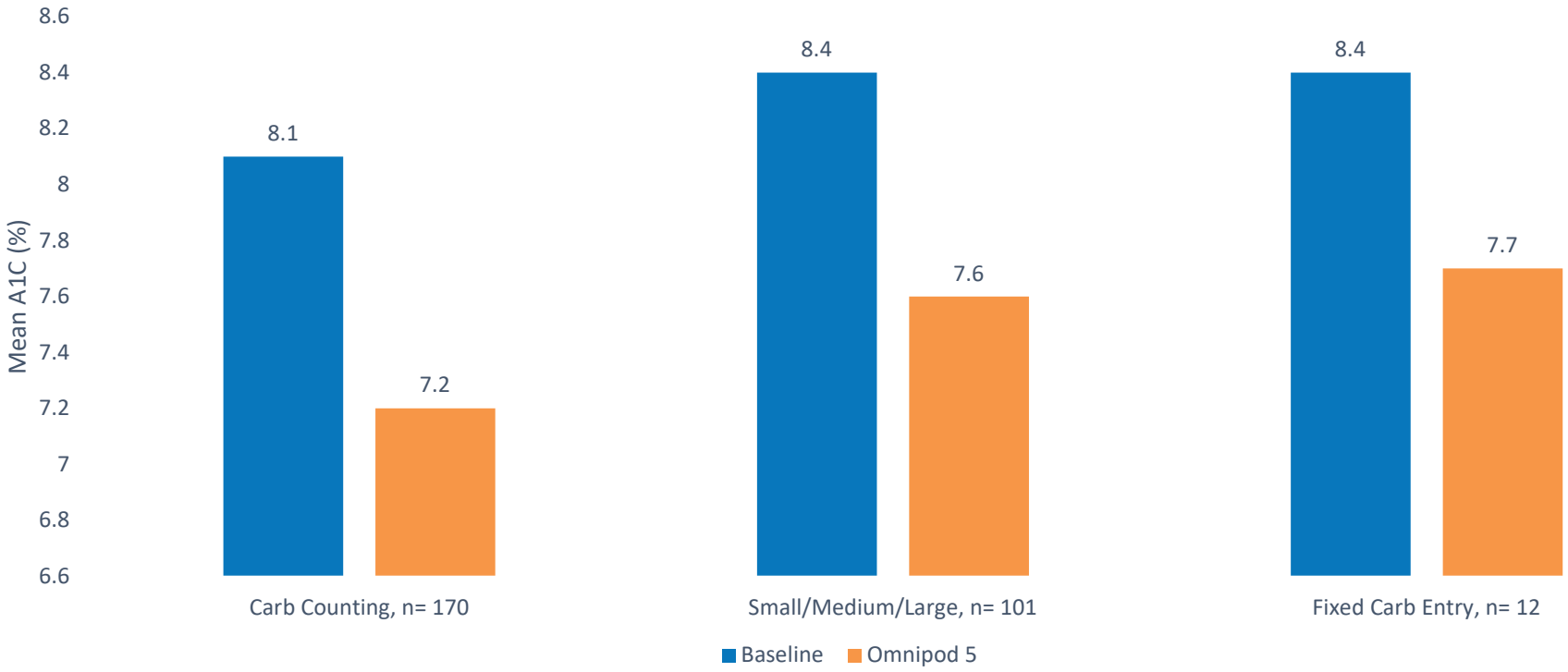
Slide 61

DI1 New slide

Diana Isaacs, 2026-04-10T10:34:18.838

DI1

Different Bolus Strategies



Automated Insulin Delivery in Adults with Type 2 Diabetes: a nonrandomized clinical trial. *JAMA Netw Open.* 2025; 8(2)

Slide 62

DI1 Updated slide
Diana Isaacs, 2026-04-10T10:34:53.613

Omnipod 5

Holds 200 units
Compatible with Dexcom G6, G7, Libre 2+
No tubing
Control system from a compatible smartphone or controller
Uses last 4-5 pods for adjustments, based on TDD
SmartBolus calculator informed by CGM value and trend
Glucose targets from 110-150 mg/dL adjustable in 10 mg/dL increments
Activity mode to protect from lows
Bluetooth connectivity with Glooko, automatic data uploads

Omnipod 5 Automated Insulin Delivery System. User Guide.

DI1

Minimed 780G

- Holds 300 units
- Compatible with Guardian 4, Simplera Sync, Instinct
- Meal detection (auto correction + basal)
- Adjustable target (100, 110, 120mg/dL)
- Suspend before/on low options (in manual mode)
- Bluetooth connectivity, remote software upgrades
- MiniMed and Carelink apps for data sharing/viewing
- 7 day infusion set option
- Uses AA battery

MiniMed™ 780G system - User Guides & Manuals | Medtronic

DI1 Updated sensor compatibility.
Diana Isaacs, 2026-04-10T02:17:38.377

Beta Bionics iLet

- Holds 180 units of insulin
- Compatible with Dexcom G6, G7, Libre 3+
- Works with pre-filled insulin cartridges (Fiasp) -160 units
- Programmed by entering body weight and connecting to CGM
  - No other insulin pump settings
- Glucose targets (110, 120, or 130mg/dL)
- Meal estimates: no carb counting (usual, less, more)
- Provides calculated back up settings for boluses
- Requires charger
- 3 algorithms: meal, basal, correction
- Bluetooth connected, Bionic Circle app for up to 10 followers

DI1

[Beta Bionics User Resources]

Slide 65

DI1 updated

Diana Isaacs, 2025-08-26T01:47:09.791

DI1

Tandem T:Slim X2 with Control-IQ+

- Holds 300 units
- Compatible with Dexcom G6, G7, Libre 3+
- Algorithm adjusts insulin delivery from programed “manual” settings
- Automatic correction doses
  - Up to 1 every hour based on projected glucose >180mg/dL
  - Calculated at 60% of programmed correction factor (target of 110)
- Tandem T:Slim mobile app to bolus and for remote downloads
- Requires charging cable

User Guides for Tandem Diabetes Care Products

Slide 66

DI1 updated
Diana Isaacs, 2025-08-26T01:47:53.175

Control IQ+ Targets

		Control-IQ	Sleep Activity	Exercise Activity
Delivers	Delivers an automatic correction bolus if sensor glucose is predicted to be above ____ mg/dL	180	--	180
Increases	Increases basal insulin delivery if sensor glucose is predicted to be above ____ mg/dL	160	120	160
Maintains	Maintains active Personal Profile settings when sensor glucose is between ____ - ____ mg/dL	112.5 - 160	112.5 - 120	140 - 160
Decreases	Decreases basal insulin delivery if sensor glucose is predicted to be below ____ mg/dL	112.5	112.5	140
Stops	Stops basal insulin delivery if sensor glucose is predicted to be below ____ mg/dL	70	70	80

Tandem Mobi with Control IQ+

- Holds 200 units
- Half the size of T:Slim X2
- Dexcom G6, G7 integration
- Runs the Control IQ algorithm
- 5-Inch tubing option
- Everything controlled from mobile app except quick bolus option from pump (Tandem Mobi mobile app)
- Syringe-driven pump fill
- Wireless charging
- IP28 water resistant rating (8 feet for 2 hours)

User Guides for Tandem Diabetes Care Products

Sequel Twiist

- Holds 300 units of insulin
- Superior occlusion detection
- Tidepool Loop Algorithm
  - iPhone controlled
  - Bolus from Apple watch
  - 6-hour predictions, uses manual settings for automation
- Correction Range 87mg/dL-180 mg/dL
- Glucose Safety Limit: 67-110 mg/dL
- Food type for bolus speed
  - Lollipop, Taco, Pizza Bolus (up to 8 hr absorption)
  - Ability for retroactive carb entries
- Pre-meal preset option (67-130mg/dL)
- Work-out preset option (87-250mg/dL)

https://www.twiist.com/hcp-home

DI1

AID System Comparison

	Omnipod 5	Control IQ+	780G	iLet	Twiist
Max fill	200 units	300 units (T:Slim X2) 200 units (Mobi)	300 units	180 units	300 units
CGM compatibility	Dexcom G6, G7, Libre 2+	Dexcom G6, G7, Libre 2+, Libre 3+	Guardian, Simplera Sync, Instinct	Dexcom G6, G7, Libre 3+	Libre 3+
Lowest algorithm target/range	110mg/dL 100mg/dL (coming soon)	112.5-120mg/dL	100mg/dL	110mg/dL	87mg/dL 67mg/dL (pre-meal preset)
Basal automation	Calculated from total daily insulin, updated each pod change, 60 min prediction	Increases or decreases from **programmed basal rates**, 30 min prediction	Calculated based on total daily insulin from past 2-6 days	Initiated based on user weight and adapts with glucose profile	Increases or decreased from **programmed basal rates**, 6 hour prediction
Automated correction bolus	No	1/hour if glucose predicted >180mg/dL, 60% of calculated dose	If glucose > 120 mg/dL and at max "auto basal" delivery, up to every 5 min	Yes	No
Extended Bolus	No	Yes, up to 8 hours	No	No	No, carb absorption time up to 8 hours
Temp Basals	No	Yes	No	No	No

ICR: insulin to carbohydrate ratio, IAT: insulin action time, ISF: insulin sensitivity factor, NA: not available
Data obtained from user manuals

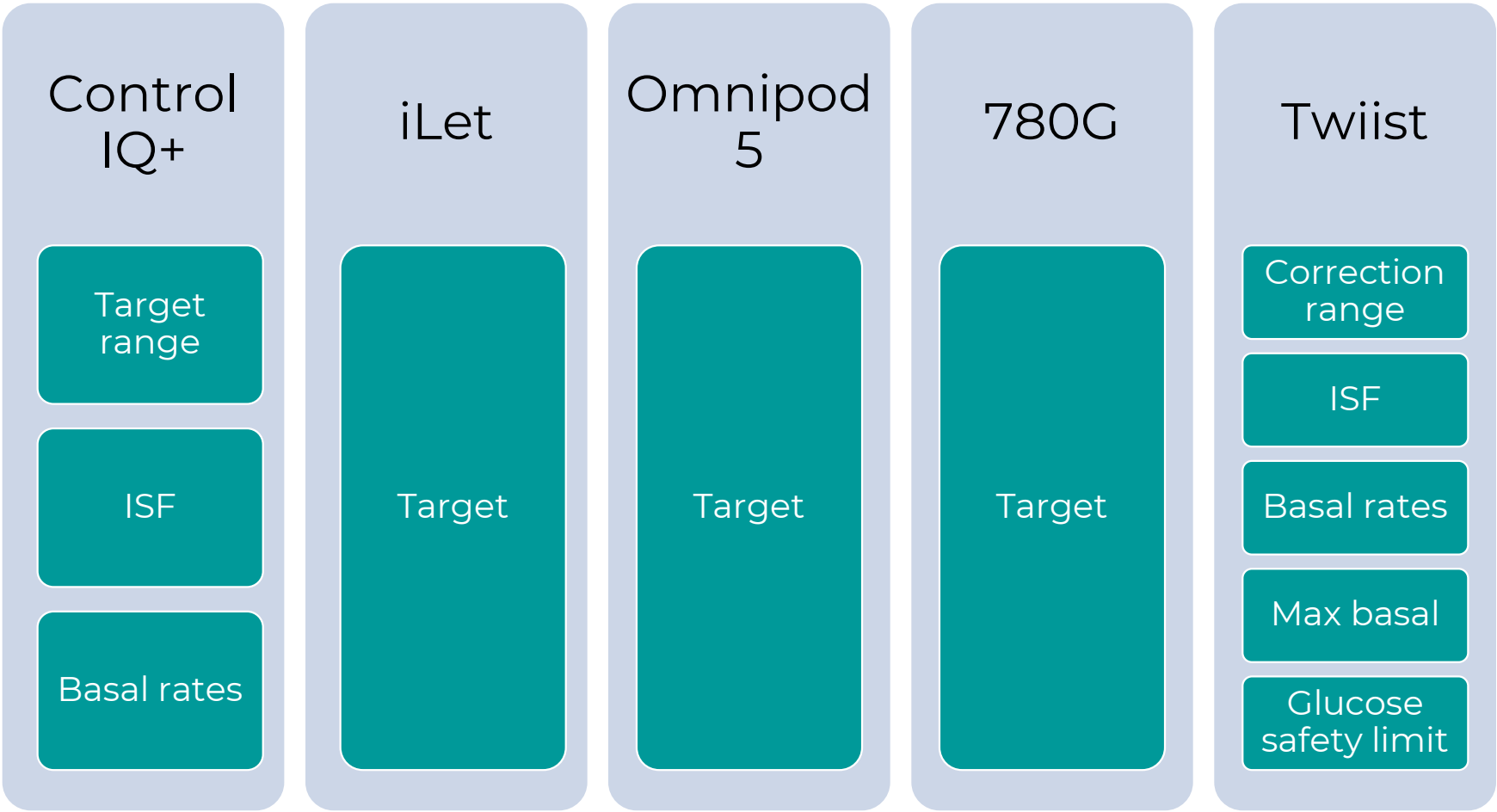
Slide 70

DI1 new

Diana Isaacs, 2026-04-10T10:28:26.753

DI1

Background Insulin Modulation



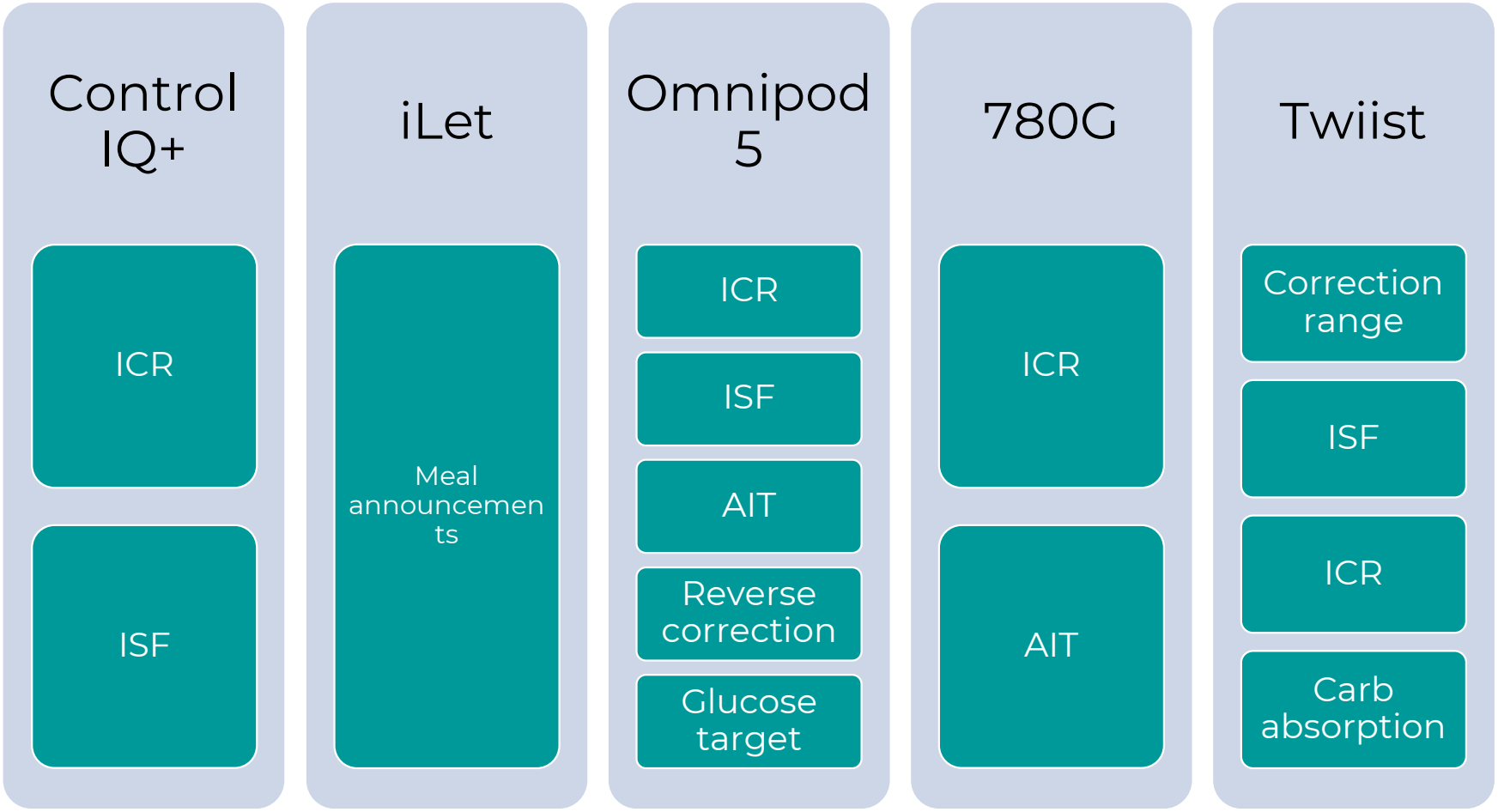
Slide 71

DI1 new

Diana Isaacs, 2026-04-10T10:28:13.858

DI1

Bolus Insulin Modulation



Slide 72

DI1 new

Diana Isaacs, 2026-04-10T10:28:19.799

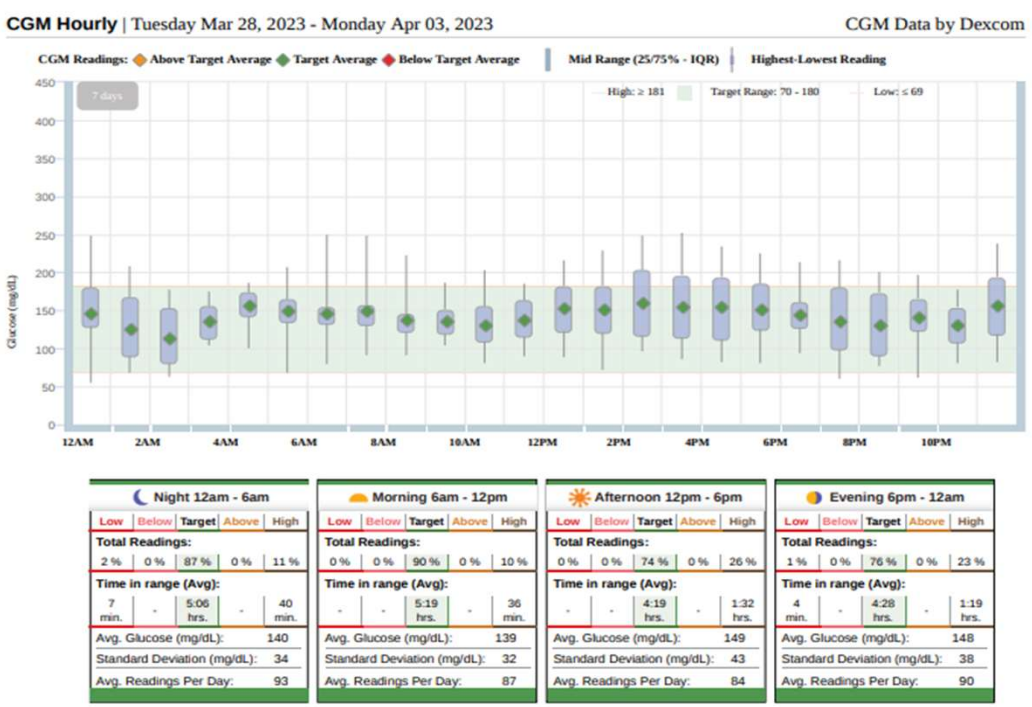
Patient Case

- 47 years old
- T2D x 20+ years
- A1C=8.1%
- BMI=39kg/m^2
- Works as a bank teller
- No diabetes complications
- Meds:
  - Insulin glargine 100 units qpm
  - Insulin aspart 45 units TID a.c.
  - Dapagliflozin 10mg daily
  - Dulaglutide 1.5 mg weekly

Is this a good candidate for an insulin pump?

Patient Case

47yo T2DM, A1C=8.1%, BMI=39kg/m²

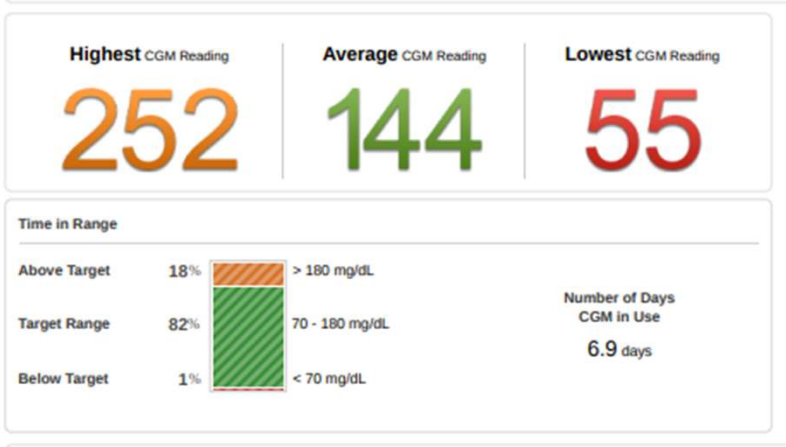


Night 12am - 6am				
Low	Below	Target	Above	High
Total Readings:				
2 %	0 %	87 %	0 %	11 %
Time in range (Avg):				
7 min.	-	5:06 hrs.	-	40 min.
Avg. Glucose (mg/dL):	140			
Standard Deviation (mg/dL):	34			
Avg. Readings Per Day:	93			

Morning 6am - 12pm				
Low	Below	Target	Above	High
Total Readings:				
0 %	0 %	90 %	0 %	10 %
Time in range (Avg):				
-	-	5:19 hrs.	-	36 min.
Avg. Glucose (mg/dL):	139			
Standard Deviation (mg/dL):	32			
Avg. Readings Per Day:	87			

Afternoon 12pm - 6pm				
Low	Below	Target	Above	High
Total Readings:				
0 %	0 %	74 %	0 %	26 %
Time in range (Avg):				
-	-	4:19 hrs.	-	1:32 hrs.
Avg. Glucose (mg/dL):	149			
Standard Deviation (mg/dL):	43			
Avg. Readings Per Day:	84			

Evening 6pm - 12am				
Low	Below	Target	Above	High
Total Readings:				
1 %	0 %	76 %	0 %	23 %
Time in range (Avg):				
4 min.	-	4:28 hrs.	-	1:19 hrs.
Avg. Glucose (mg/dL):	148			
Standard Deviation (mg/dL):	38			
Avg. Readings Per Day:	90			



TDD decreased by 30%

Follow-Up A1C=6.7%

ADA Standards of Care 2026 DI1

	Recommendation Summary	Grade
7.25a	**AID systems are the preferred insulin delivery method over MDI, CSII, and sensor-augmented pumps in people with type 1 diabetes, adults with type 2 diabetes A, children and adolescents with type 2 diabetes E, and those with other forms of insulin- deficient diabetes**. Choice of an AID system should be made based on the individual's circumstances, preferences, and needs E.	A,E
7.25b	**Consider AID systems for select people with type 2 diabetes treated with basal insulin not achieving individualized glycemic goals**.	B

Slide 75

DI1 Updated
Diana Isaacs, 2026-04-10T10:28:46.691

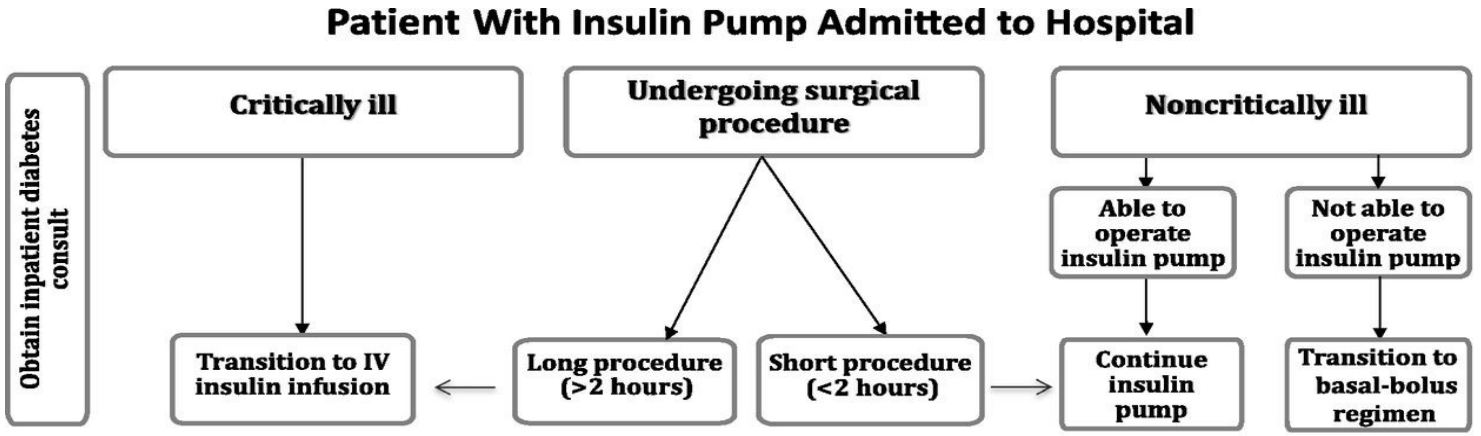
DI1

Accessing Cloud-Based Data

System:	Associated Mobile Apps	Website to Access Portal	Data Sources
Glooko	Omnipod 5, Glooko	glooko.com	Omnipod 5
Carelink	MiniMed mobile, Carelink mobile	carelink.medtronic.com/login	Minimed pumps
Tidepool	Tidepool mobile, Twiist AID system, twist insight	tidepool.org	Twiist, Open-source Loop
Source	T:slim mobile, Mobi mobile	source.tandemdiabetes.com	Tandem pumps
Beta Bionics User Portal	Bionic circle, iLet app	report.betabionics.com/	iLet

Slide 76

DI1 updated
Diana Isaacs, 2026-04-10T02:20:50.188



Changes to Pump Therapy With Imaging Studies	
X-ray/CT	Pump should be covered by lead apron
MRI	Pump and metal infusion set should be removed
Ultrasound	No need to remove pump but transducer should not be pointed directly at the pump
Cardiac catheterization	Pump should be covered by lead apron
Pacemaker/automatic implantable cardioverter defibrillator (AICD)	Pump should be covered by lead apron
Colonoscopy/EGD	Pump can remain in place
Laser surgery	Pump can remain in place

Umpierrez G et al. Diabetes Care 2018 Aug; 41(8): 1579-1589.

Contraindications to Insulin Pumps in the Hospital

Impaired level of consciousness (except during short-term anesthesia)
Patient's inability to correctly demonstrate appropriate pump settings
Critical illness requiring intensive care
Psychiatric illness that interferes with a patient's ability to self-manage diabetes
Diabetic ketoacidosis and hyperosmolar hyperglycemic state
Refusal or unwillingness to participate in self-care
Lack of pump supplies
Lack of trained health care providers, diabetes educators, or diabetes specialist
Patient at risk for suicide

Umpierrez G et al. Diabetes Care 2018 Aug; 41(8): 1579-1589.

Connected Insulin Pens

DI1

Connected Insulin Pen Basics

A reusable pen or pen cap paired with a smartphone mobile app	Calculates and tracks insulin doses	Tracks active insulin time	Pairs with connected BGM and CGM
Cloud-based data access	Dose reminders	Insulin expiration	Temperature indicator

Slide 80

DI1 New slide

Diana Isaacs, 2025-08-26T01:56:49.814

DI1

ADA SOC 2026:
Who Should Use Connected Pens?

7.23 Offer connected insulin pens for people with diabetes taking multiple daily insulin injections when appropriate. B

7.24 FDA-approved insulin dose calculators/decision support systems may be helpful for calculating insulin doses. B

Slide 81

DI1 New slide
Diana Isaacs, 2025-08-26T01:56:54.963

DI1 0 Updated for 2026
Diana Isaacs, 2026-04-10T02:21:52.092

DI1

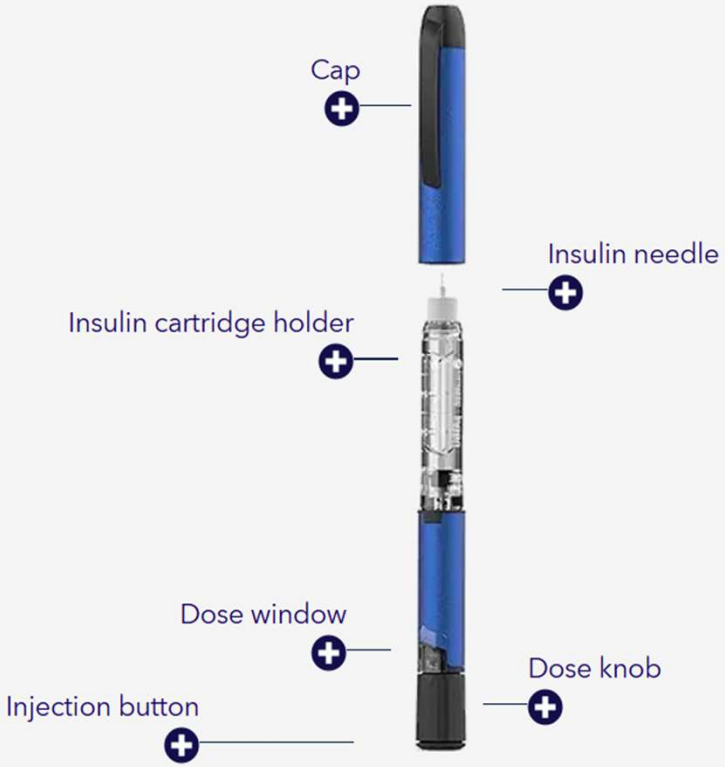
InPen

- Reusable pen for up to 1 year without charging
- InPen app – Bluetooth connected
- Integrated with Simplera Sync and Dexcom G6/G7
- Works with Fiasp, Humalog, NovoLog cartridges
- Delivers boluses in 0.5 unit increments up to 30 units/dose
- Monitors insulin temperature excursions
- Dose calculator, records exact doses, priming doses

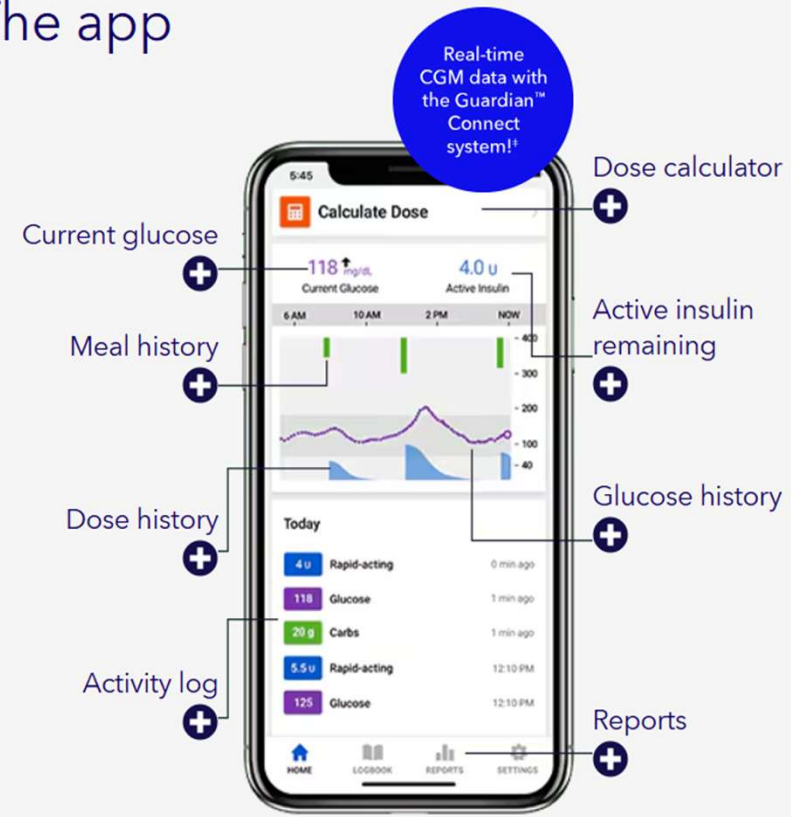
Slide 82

DI1 updated
Diana Isaacs, 2025-08-26T01:57:03.767

The pen



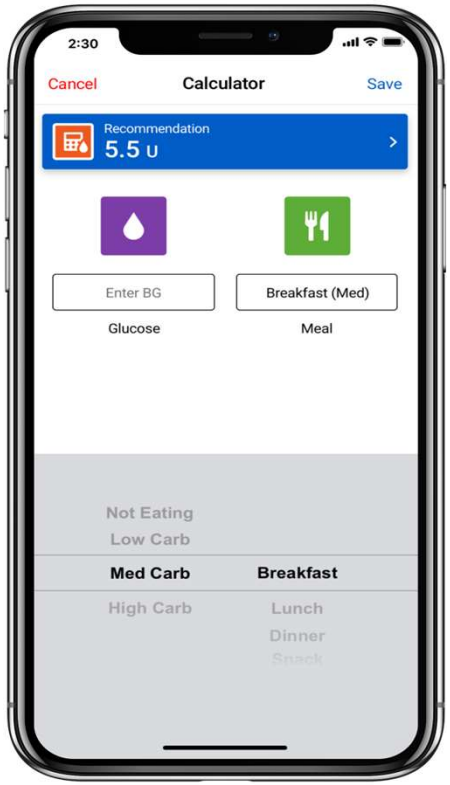
The app



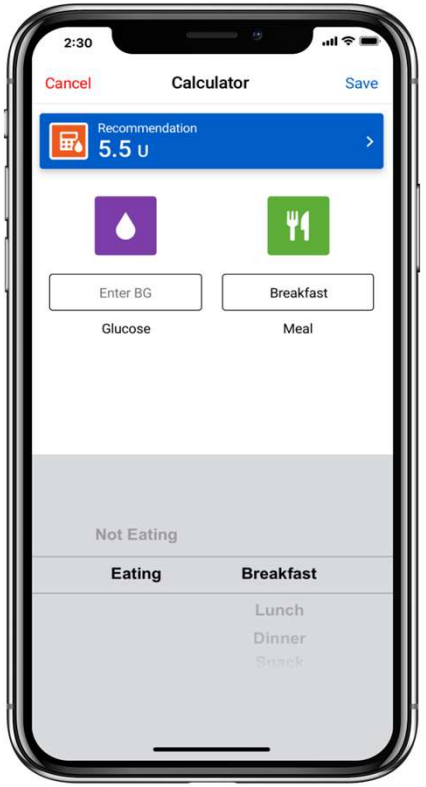
User Guide

Dose Calculator

Carb Counting



Meal Estimation



Fixed Dose

Different Dose Calculators

Fixed dose

“I don’t even know what a carb is. I am just trying to reduce my portion sizes.“

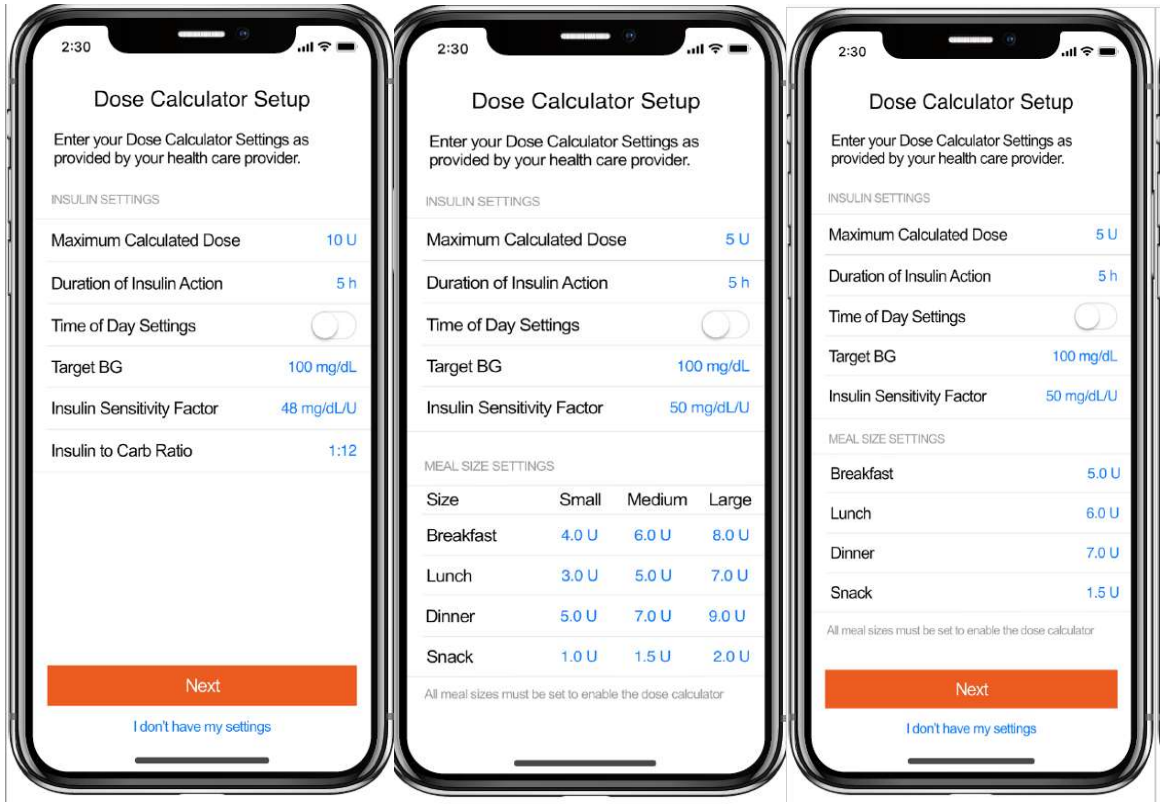
Meal estimation

“Counting carbs is a bit overwhelming. But since I don’t always eat the same amount, I need to vary my dose!”

Carb counting

“I'm pretty good at figuring out the exact amount of carbs I eat; I use 3 different carb ratios in my dose calculator to match my insulin dose to my food.”

Therapy Settings



Time of Day Settings

Time of Day	6:00 AM	11:00 AM	5:00 PM	10:00 PM
Target Blood Glucose	100 mg/dL	90 mg/dL	90 mg/dL	110 mg/dL
Insulin Sensitivity Factor	35.0 mg/dL/U	38.0 mg/dL/U	38.0 mg/dL/U	38.0 mg/dL/U
Insulin to Carb Ratio	9.0 g/U	11.0 g/U	11.0 g/U	11.0 g/U

Connected Pen Settings

- Correction factor: rule of 1700
  - 1700/TDD
- May use existing MDI settings
  - Long acting insulin
  - Meal time doses
- Meal estimates:
  - Small: 20-25% less
  - Large: 20-25% more
- Carb ratios: rule of 450
  - 450/TDD

In Summary

- There are several CGM, connected pen and insulin pump options, and the DCES can help PWD select the best device for their individual needs
- New era of hybrid closed loops
- No artificial pancreas yet, but we are getting closer to closing the loop
- Connected data can be used to discussion diabetes self-management with the person with diabetes and help to make meaningful changes-think DATAA

Resources

Collaborate: How to Share Data

System:	Associated Mobile Apps	Data Sources
Glooko	Glooko	Omnipod 5, Dexcom, Libre, Eversense, many glucose meters, InPen
Clarity	Dexcom G6, G7, Clarity, Dexcom Follow,	Dexcom, InPen
LibreView	LibreLink, LibreLinkUp, Libre, Libre 2, Libre 3	Libre 14 day, Libre 2+, Libre 3+
Carelink	MiniMed Connect, Carelink Connect	780G, Simplera, Instinct, InPen
Tidepool	Tidepool Mobile	Twiist,, Dexcom, Libre, many glucose meters, InPen
Source	Tandem t:slim mobile app, Tandem mobi mobile app	T:Slim X2, Mobi
Eversense Data Management System	Eversense	Eversense
InPen Insights Report	InPen	InPen, Dexcom, Simplera

Slide 90

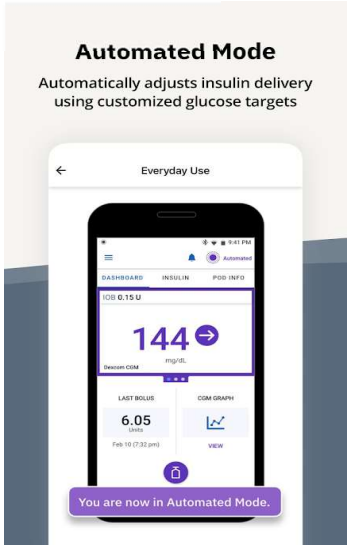
DI1 updated

Diana Isaacs, 2025-08-26T02:00:40.896

DI1

Simulation Apps/Websites

MiniMed Virtual Pumps



[Virtual Pump Demo | Medtronic](https://www.medtronicdiabetes.com/minimed-virtual-pump)
https://www.medtronicdiabetes.com/minimed-virtual-pump

iLet simulator
https://simulatorapp.betabionicsweb.com/SimulatorEntry

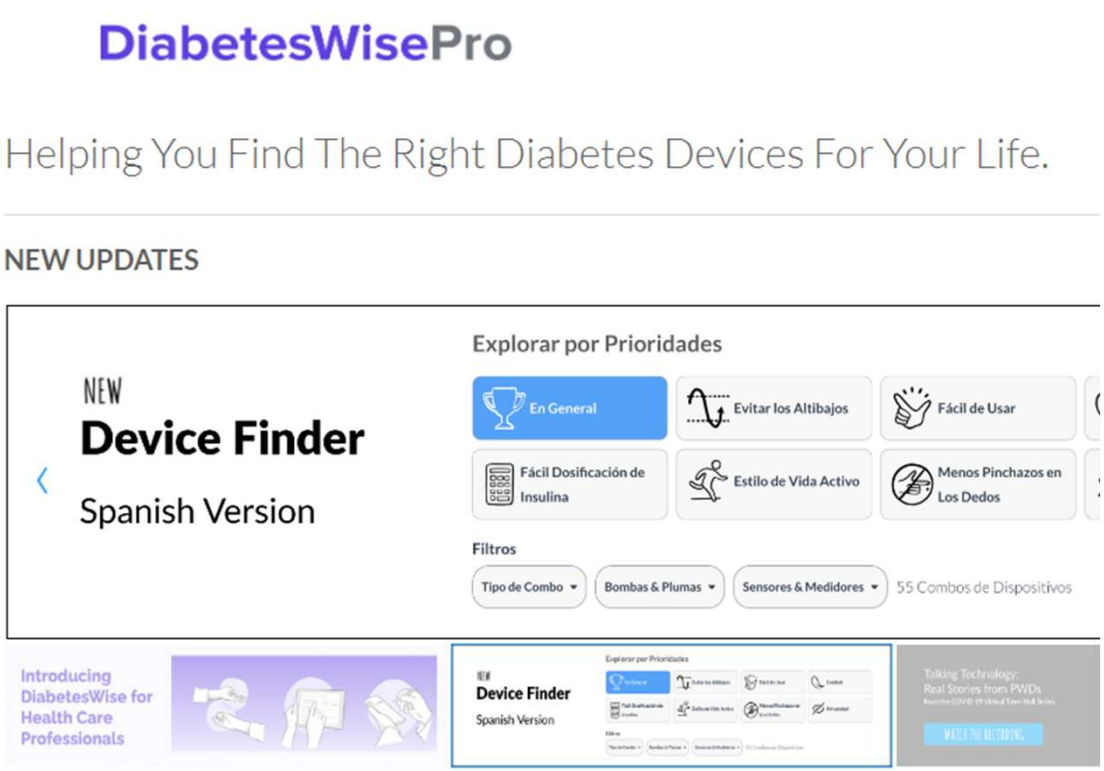
https://main.dugvvq4v5elvs.amplifyapp.com/dashboard

Slide 91

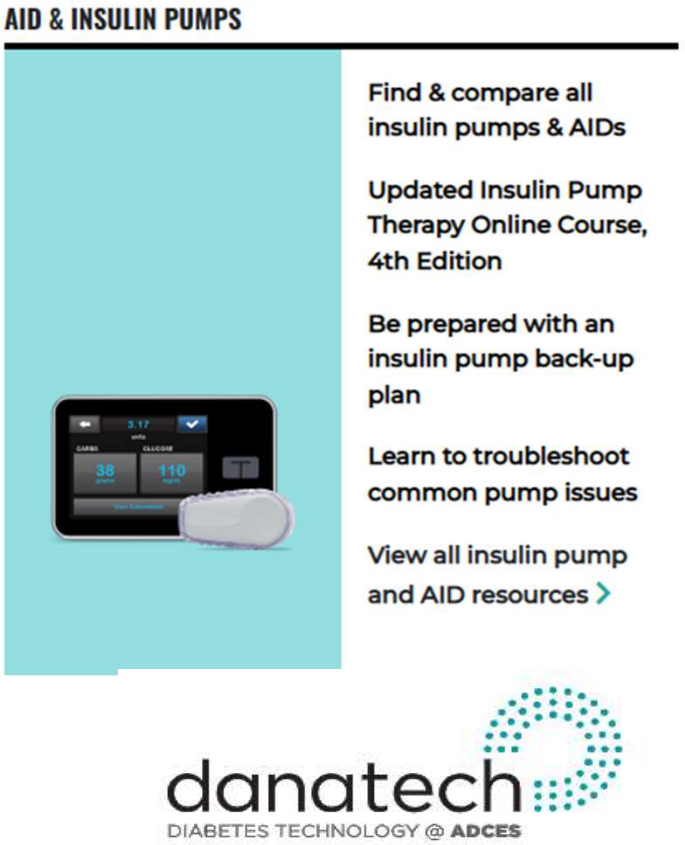
DI1 New slide

Diana Isaacs, 2026-04-10T10:37:04.808

Learn All About the Tech



https://pro.diabeteswise.org/



https://www.diabeteseducator.org/danatech/home)/

DI1

A Great Resource: Panther Tools

Control-IQ

Glooko reports

View PDF

Source reports

View PDF

Omnipod 5

Glooko reports

View PDF

Discover reports

View PDF

MiniMed 780G

View PDF

Slide 93

DI1 New slide

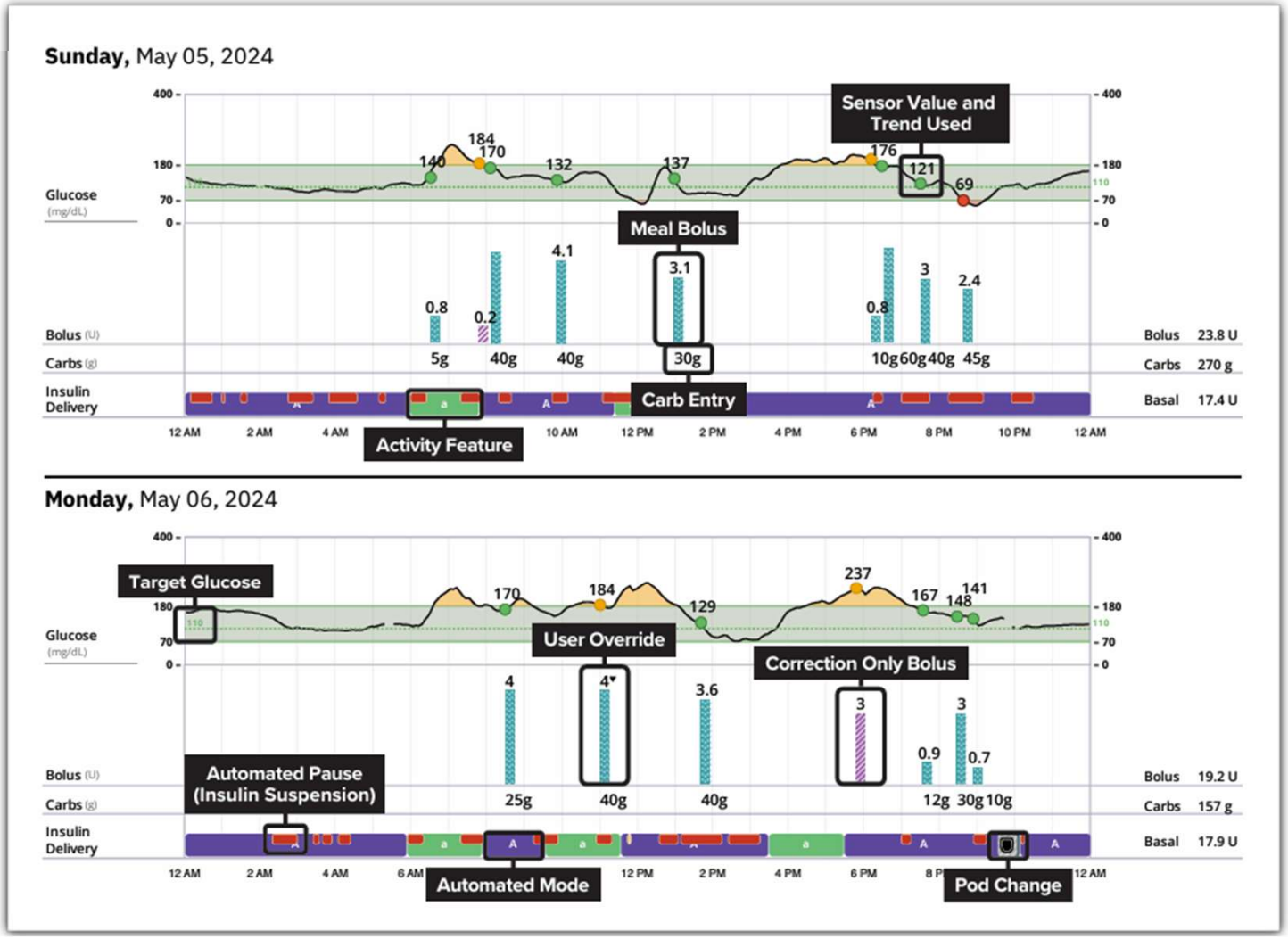
Diana Isaacs, 2026-04-10T10:35:37.235

DI1

Panther Tools

Data Interpretation

Use the **Daily View** and discussion with the user to identify causes of the glycemic patterns identified in STEP 1 (hypoglycemia or hyperglycemia).



[Diabetes Technology. Deciphered. | PANTHER Program](https://www.pantherprogram.org)
https://www.pantherprogram.org

Slide 94

DI1 New slide

Diana Isaacs, 2026-04-10T10:35:44.432

Cleveland Clinic

Every life deserves world class care.

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