Using Medical Devices and Treating People with Diabetes

Anne Peters, MD
Diabetologist
Professor of Medicine (Clinical Scholar)
USC Keck School of Medicine

Disclosure of Potential Conflicts of Interest

Consulting

- Medscape
- Vertex
- Lilly

Research

- Insulet
- Abbott

Stock Options

- Omada Health

Learning Objectives

At the end of the session, learners will be able to:

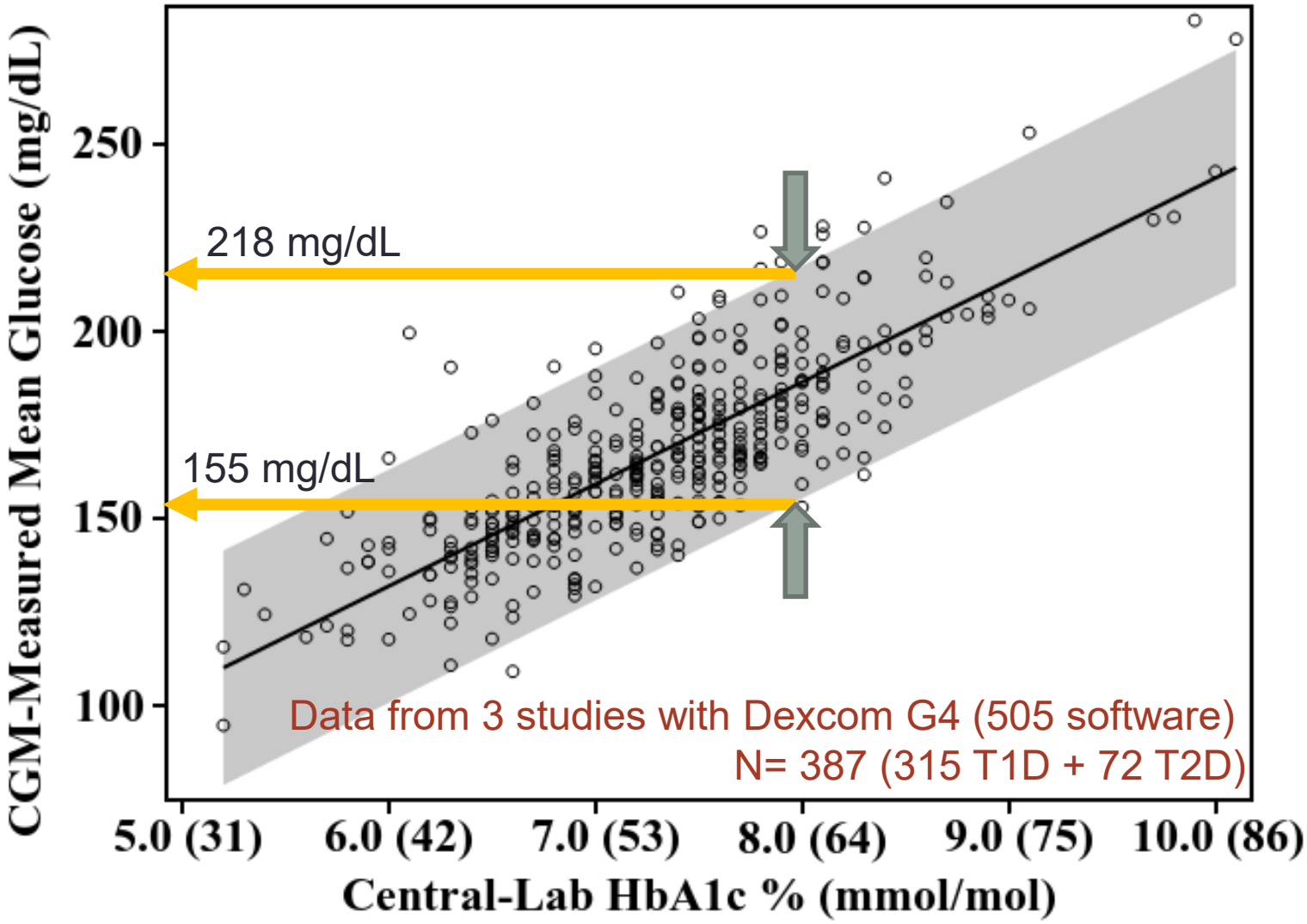
1. Determine who should get a diabetes device.
2. Understand the principals of device use
3. Discuss how devices can be used to improve glycemic outcomes

Is A1c Enough To Help Us Manage Patients?

- **Strengths of A1c**
  - Reflects blood glucose concentrations over ~3 months
  - Only metric of glycemic control that has been prospectively associated with chronic complications
  - Useful for assessing trends in a population over time
- **Limitations of A1c**
  - Affected by other conditions that affect red blood cell lifespan or interfere with glucose binding to hemoglobin
  - A wide range of mean glucose concentrations exist for a given HbA1c level
  - Provides no information about hypoglycemia frequency or severity
  - May under-represent the burden of hyperglycemia in African-Americans

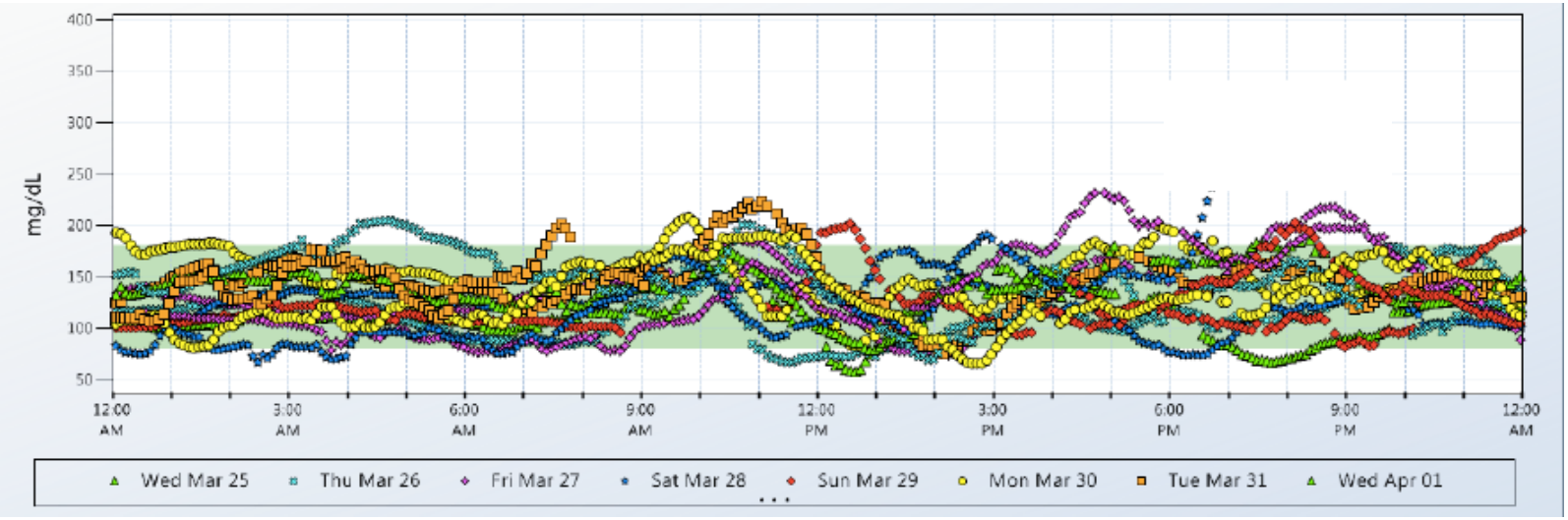
Beck RW, et al. Diabetes Care. 2017;40:994-999.

CGM-measured Mean Glucose Versus Lab-Measured HbA1c



Slide thanks to Roy Beck (Beck RW, et al. Diabetes Care. 2017;40:994-999.)

Real-Time CGM: A1C of 6.8% in a person on multiple daily insulin injections (MDI)



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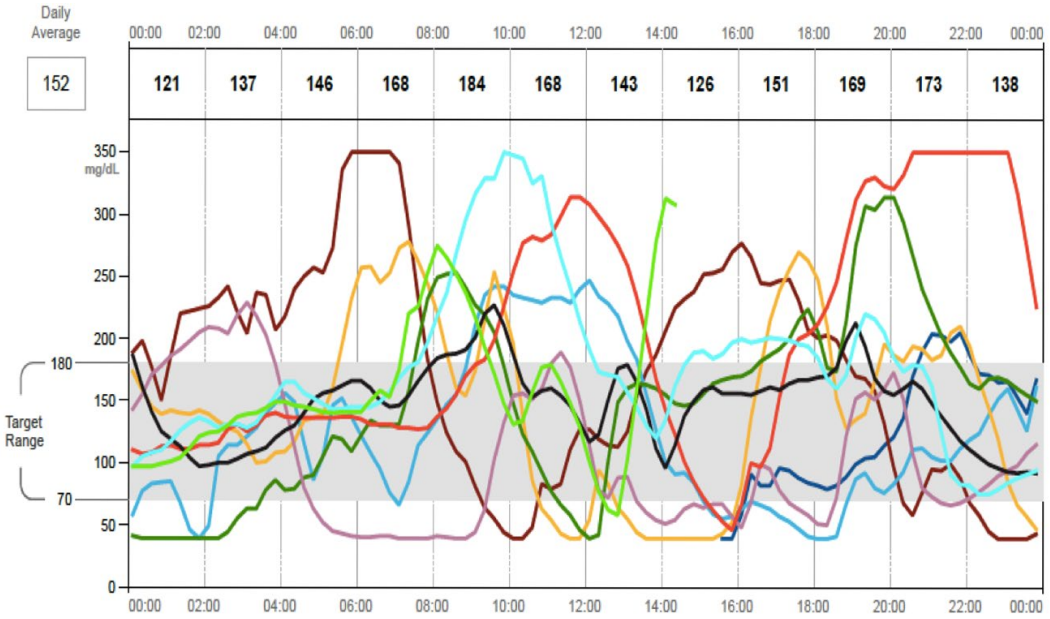
Real Time CGM: A1C of 6.9% in a person on MDI



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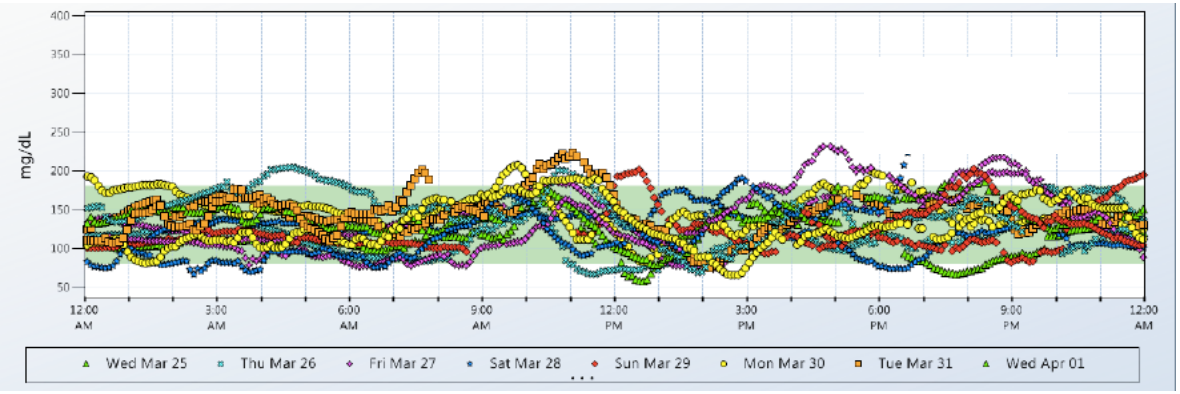
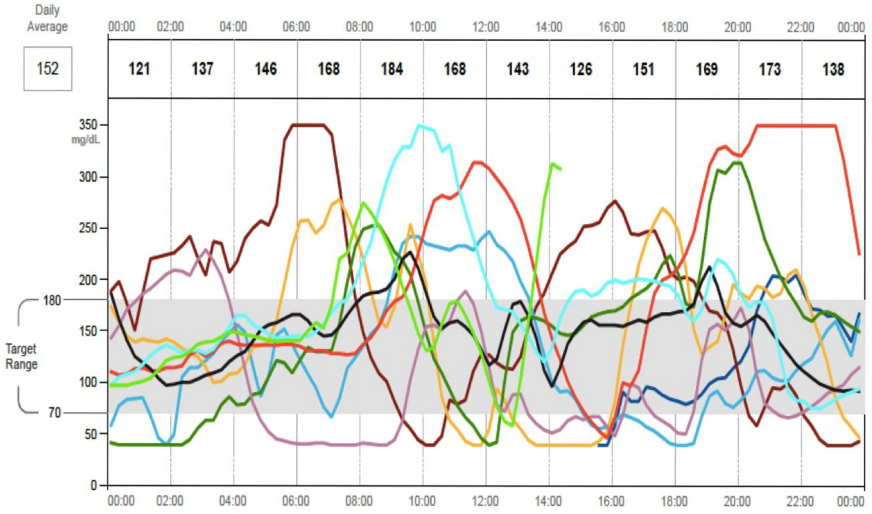
The Same A1C, Very Different Glucose Control





Use of CGM

- There is strong evidence that CGMs provide cost-effective improvement in glucose control in patients with both type 1 and type 2 diabetes on insulin. The following outcomes have been shown:
  - **Reduction in HbA1c levels:** primarily seen in RCT with people with higher A1C's at baseline. In some studies with T2DM no change at all, but more recent data shows benefit.
  - **Reduction in hypoglycemia** in patients with T1DM with lower glucose targets and/or repeated episodes of hypoglycemia at baseline.
  - An **increased time in target** glucose range
    - TIR of 70% or more is correlated with an A1C of <7%, which has been shown to reduce diabetes-related complications
  - **Reduction in the rates of DKA and hospitalizations due to hypoglycemia:** primarily demonstrated in several "real-world" studies pooling from large data sources

For the patient, CGMs do the following:

- Significant reduction in/elimination of the need for fingerstick blood glucose monitoring (BGM), which is inconvenient, uncomfortable, and oftenassociated with social stigma.
- Sensor life of 10-14 days. BGM may still be needed to validate glucose levels when there is a question of CGM accuracy.
- A trend arrow alongside static glucose values, which allows the user to determine the rate and direction of change in glucose level, thereby predicting and preventing against blood sugar highs and lows before they occur.
- A sense of comfort overnight, knowing they will be alerted to low glucose levels.
- Easier glucose monitoring in workplaces and social settings that make fingersticks unsanitary or more difficult.
- Remote monitoring and data sharing, allowing family members to monitor their loved ones and providers to access a patient's glucose data before and in between clinic sessions.

For the provider, CGMs offer the following:

- Detailed data enabling safer and more educated decision-making.
- The “ambulatory glucose profile” (AGP) provides a standardized, automated summary of key glucose control metrics for describing, monitoring and managing glucose control, including time in range and frequency and time of hypoglycemic episodes.
- CGM data is used to calculate a GMI (glucose management indicator) which is a proxy for A1C and can be obtained remotely, avoiding an in-person laboratory visit. It is important to realize that the GMI is calculated from the previous 2-weeks of glucose readings and does not reflect the average glycemia of the previous 3 months that the HbA1c level does.
- The ability to upload data to an online secure database facilitates telehealth care, that can allow monitoring without face-to-face visits. Providers should access the online database through a DHS computer or VPN.
- There is increased patient engagement in self-care as patients can determine how their daily activities (including diet, exercise and medication use) alter glucose levels in real-time.

Qualifying for CGM

- Diagnosis of Type 1 or Type 2 diabetes
- Use of at least one insulin injection/day
  - Date insulin therapy initiated
- Uncontrolled blood glucose (generally HbA1c > 7.0, although there is no direct cutoff) noted in the chart
- Repeated episodes of severe hypoglycemia (at least 2 documented values < 54 within the past year, or hypoglycemia requiring assistance from a third party to correct), either in the HPI (i.e. from reported lows at home) or on lab values
- Visit with within the 6 months leading up to a CGM prescription
- At least 2 years of age (or at least 4 years of age, for Freestyle Libre)

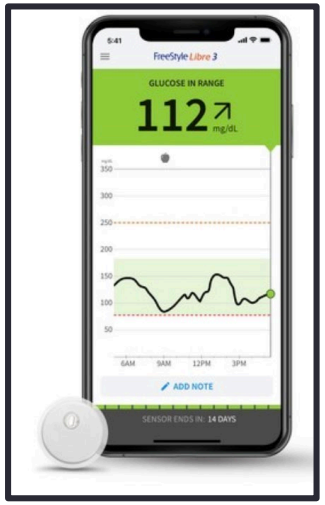
(*Me: Anyone with diabetes or prediabetes who can benefit from it)*

RT-CGM: Dexcom G6 and G7

- Factory calibrated but can be calibrated
- Has best RCT data supporting its use
- 10 days of sensor use
- Has alarms for hypoglycemia and hyperglycemia thresholds and alerts for trending high or low
- Can display glucose levels on a receiver or phone
- Can ‘share’ glucose readings with someone else (e.g., parent, spouse)
- G7 integrated into some AID systems

Libre 14-day and Libre 2

- Lasts for 14 days
- Libre 14 day (no alarms) and Libre 2 (alarms) require swiping
- Factory calibrated
- Data displayed on reader/smart phone



Libre 3

- Much smaller, no swiping, has alarms
- Can share data
- MediCal doesn't pay for receiver

OTC Dexcom Coming Summer 2024

Dexcom vs. FreeStyle Libre:

How Do These Continuous Glucose Monitors Compare

	Dexcom G6	Dexcom G7	FreeStyle Libre 14 Day	FreeStyle Libre 2	FreeStyle Libre 3
How long does the sensor last?	UP TO 10 DAYS	UP TO 10 DAYS	UP TO 14 DAYS	UP TO 14 DAYS	UP TO 14 DAYS
Time between readings:	5 MINUTES	5 MINUTES	15 MINUTES	1 MINUTE	1 MINUTE
Length of warm-up period:	2 HOURS	30 MINUTES	1 HOUR	1 HOUR	1 HOUR
Low blood sugar alerts?	✓	✓	✗	✓	✓
Smartphone capabilities?	✓	✓	✓	✓	✓
Who can use it?	ADULTS AND CHILDREN 2 YEARS AND OLDER	ADULTS AND CHILDREN 2 YEARS AND OLDER	ADULTS 18 YEARS AND OLDER	ADULTS AND CHILDREN 4 YEARS AND OLDER	ADULTS AND CHILDREN 4 YEARS AND OLDER

GoodRx Health

Starting CGM

- Download App
- Sign into account

Libre 3

Dexcom G7

Dexcom Clarity
Medical

Dexcom G7
Continuous Glucose Monitoring

Dexcom Follow
CGM Remote Monitoring

Libre 3 Alarms

Dexcom Alarms

Alert Settings for Device

General

Low	On	70 mg/dL
Low Repeat	On	15 min
High	Off	200 mg/dL
High Repeat	Off	30 min
Fall Rate	On	3 mg/dL/min
Rise Rate	On	3 mg/dL/min
Urgent Low	On	55 mg/dL
Urgent Low Repeat	On	30 min
Urgent Low Soon	On	55 mg/dL
Urgent Low Soon Repeat	On	30 min
Signal Loss	Off	20 min

Scheduled - Bedtime

Status: On
Sun, Mon, Tue, Wed, Thu, Fri, Sat
10:30 PM - 7:00 AM

Low	On	70 mg/dL
Low Repeat	On	15 min
High	On	250 mg/dL
High Repeat	On	60 min
Fall Rate	On	3 mg/dL/min
Rise Rate	On	3 mg/dL/min
Urgent Low	On	55 mg/dL
Urgent Low Repeat	On	30 min
Urgent Low Soon	On	55 mg/dL
Urgent Low Soon Repeat	On	30 min
Signal Loss	Off	20 min

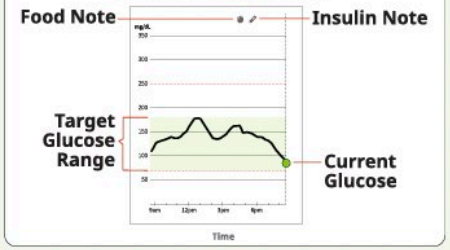
Glucose Trend Arrow

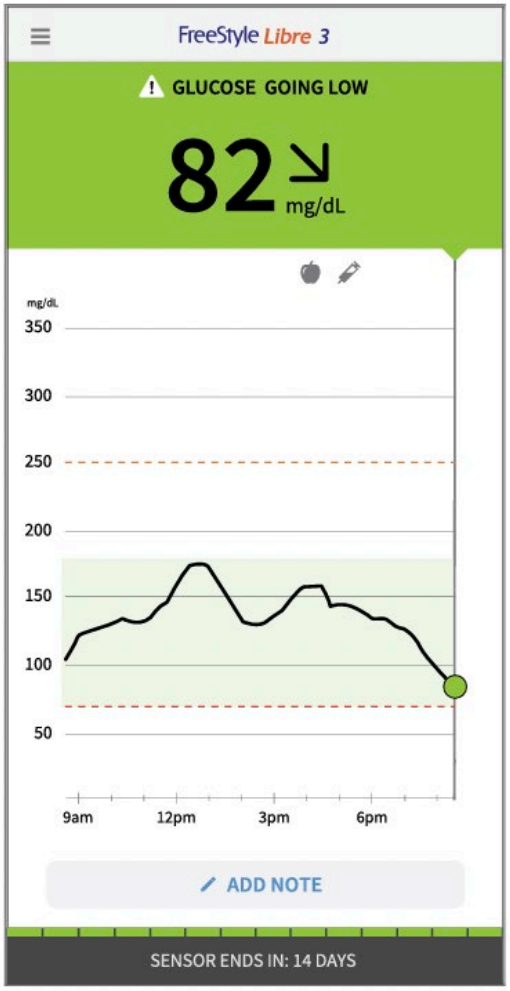
Direction your glucose is going

Arrow	What it means
↑	Glucose rising quickly
↗	Glucose rising
→	Glucose changing slowly
↘	Glucose falling
↓	Glucose falling quickly

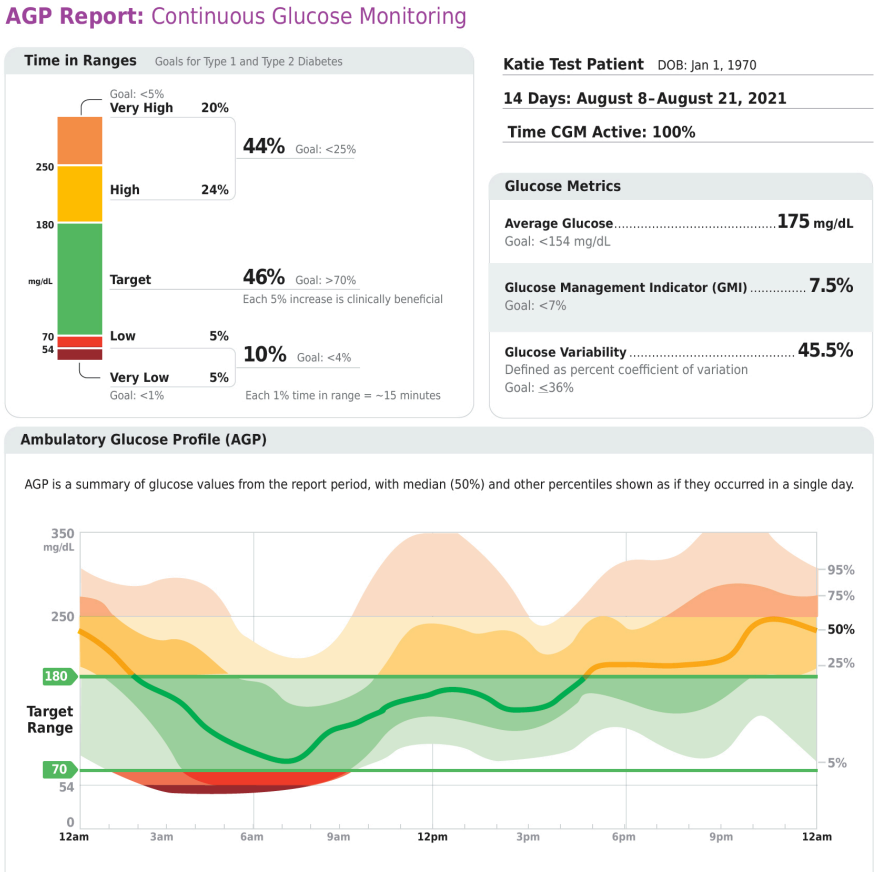
Glucose Graph

Graph of your current and stored glucose readings





How Is Data From CGM Interpreted?



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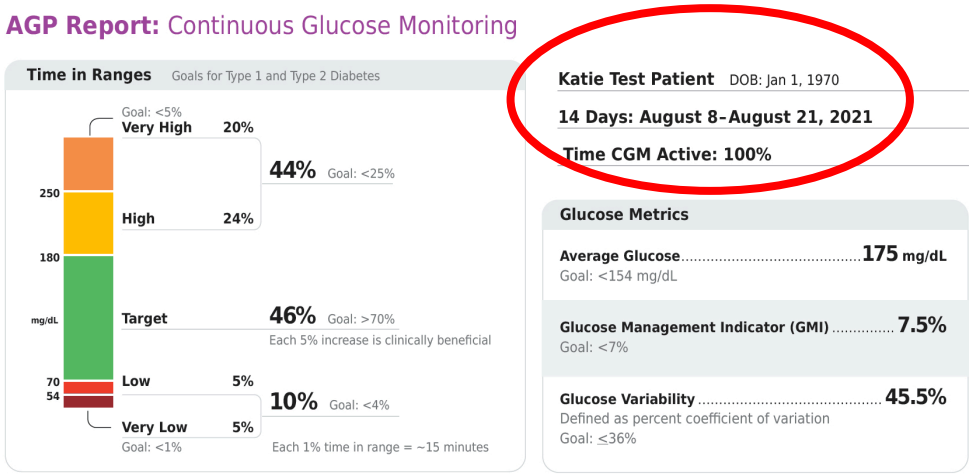
How Is Data From CGM Interpreted? Step 1

Patient name, dates, use of CGM



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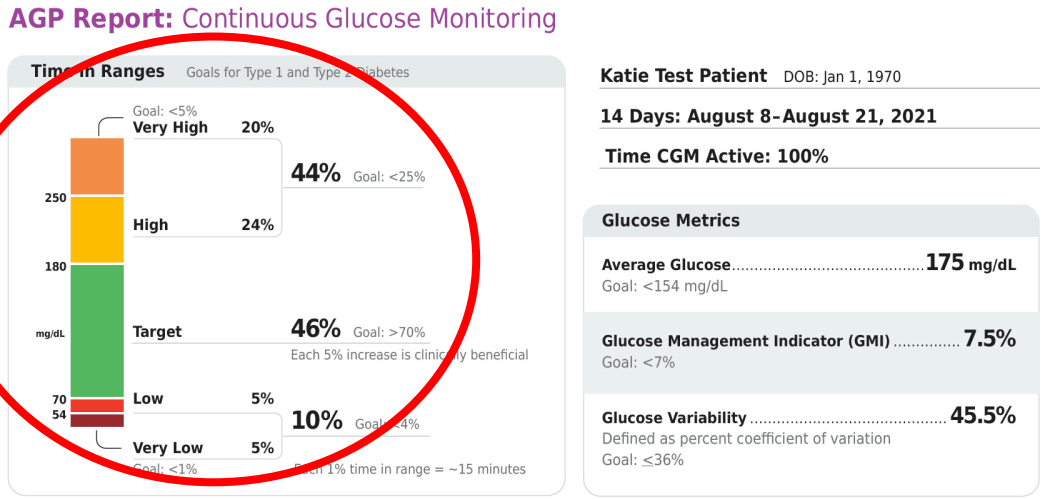
How Is Data From CGM Interpreted? Step 2

Percent time: low, in target, high



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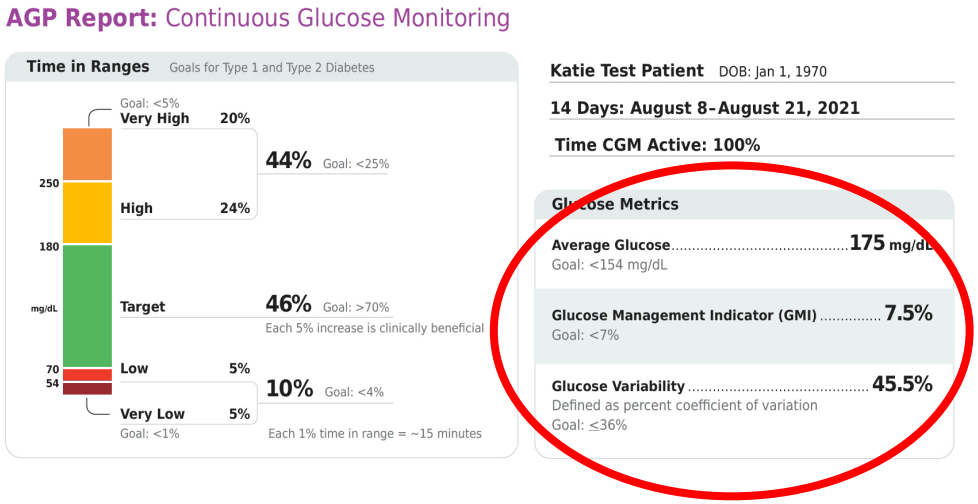
How Is Data From CGM Interpreted? Step 3

Average glucose, GMI, variability



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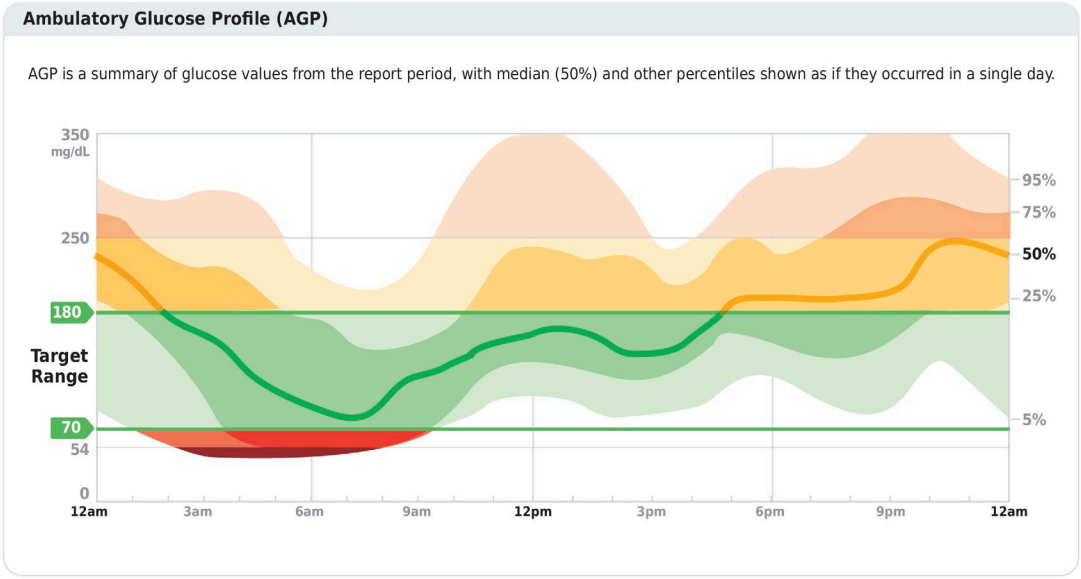
How Is Data From CGM Interpreted? Step 4

Modal Day



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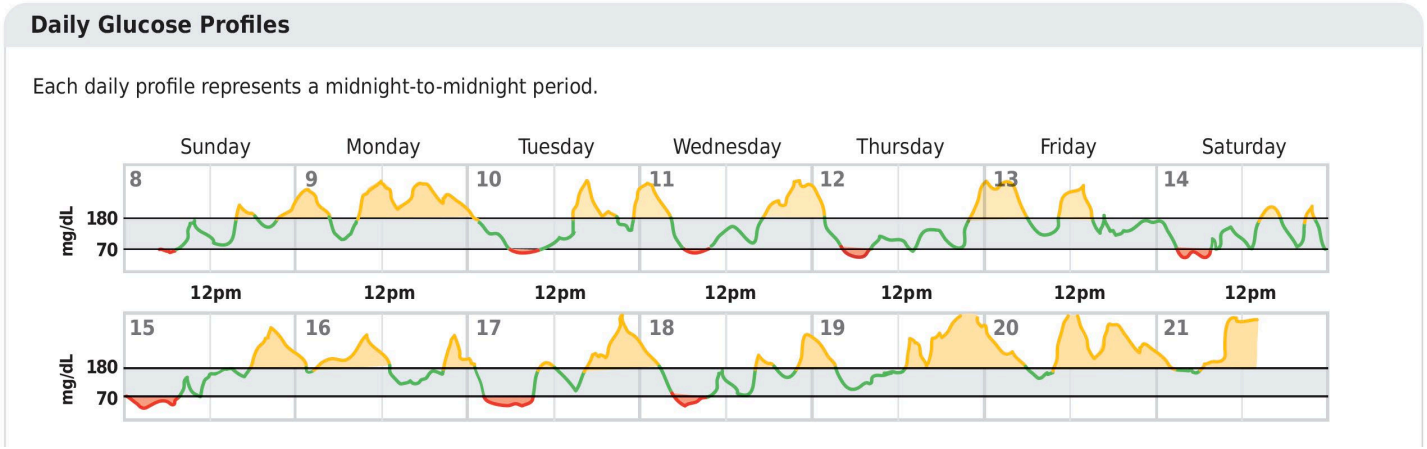
How Is Data From CGM Interpreted? Step 5

Individual Days



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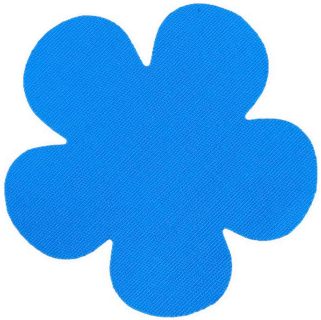
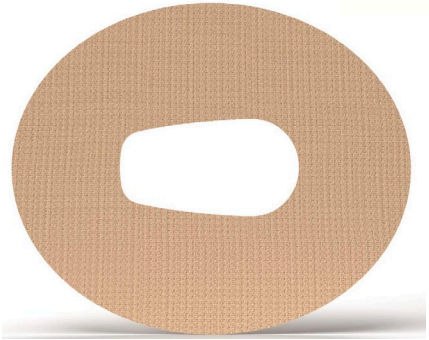
Sensor: Skin Issues

Sensors Fall Off

Many Over-Bandages Available



Liquid adhesives can make sensor stick better



Prior Authorizations

- For Medi-Cal and IHSS patients do PA through CoverMyMeds and send to a pharmacy
- For Medicare patients use Advanced Diabetes Supplies through Parachute Health, very easy platform to use and they ship to patient's home.
- Or we use Community Walgreens on Marengo for all of it, but there is a delay.
- **However, there are specific elements that must be included in the chart notes to approval so creating an autotext phrase or two for this can be very helpful.**

What Does Blood Glucose Monitoring (BGM) Show Us?

Date	Overnight			Early Morning			Late Morning			Early Afternoon			Late Afternoon			Early Evening			Late Evening			Bedtime		
	12 AM - 6 AM			AM - 9 AM			9 AM - 11 AM			11 AM - 2 PM			2 PM - 5 PM			5 PM - 7 PM			7 PM - 10 PM			10 PM - 12 AM		
	Gluc.	Med.	CHO	Gluc.	Med.	CHO	Gluc.	Med.	CHO	Gluc.	Med.	CHO	Gluc.	Med.	CHO	Gluc.	Med.	CHO	Gluc.	Med.	CHO	Gluc.	Med.	CHO
12/20/2016				110						95														
										156														
12/19/2016				89						113			210			126			216					
													182											
12/18/2016				81						80			117			104			226					
12/17/2016				92						99			167			135			140					
12/16/2016				97						94			130			131			139					
12/15/2016				87						107			123			146			215					
12/14/2016				106						130			155			105			150					
12/13/2016				98						94			125			111			166					
12/12/2016				101						132			161			143			165					
12/11/2016				84						77			99			123			161					
12/10/2016				9						105			133			170			143			129		

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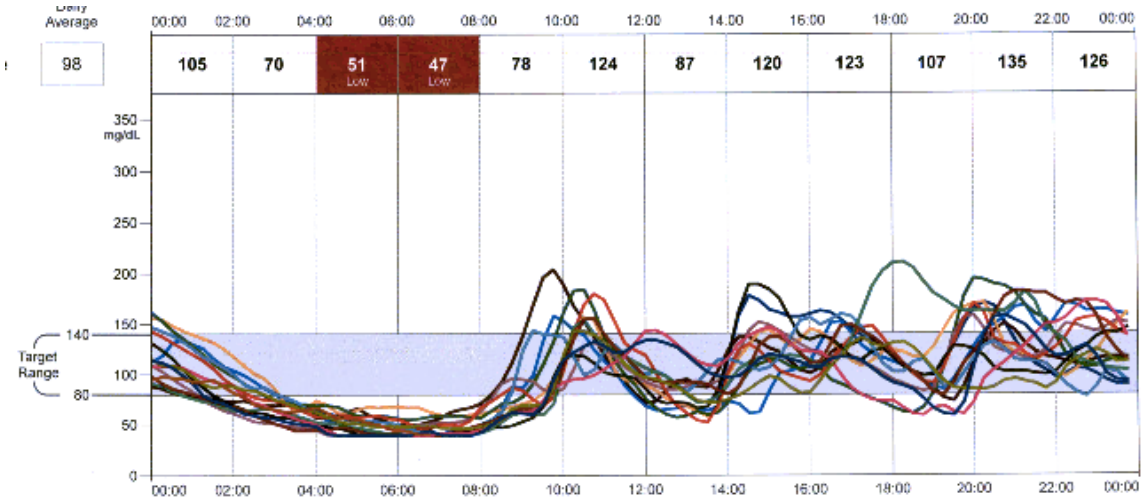
Tracing used with permission from A. Peters

What Does Blinded (Professional) CGM Show Us?



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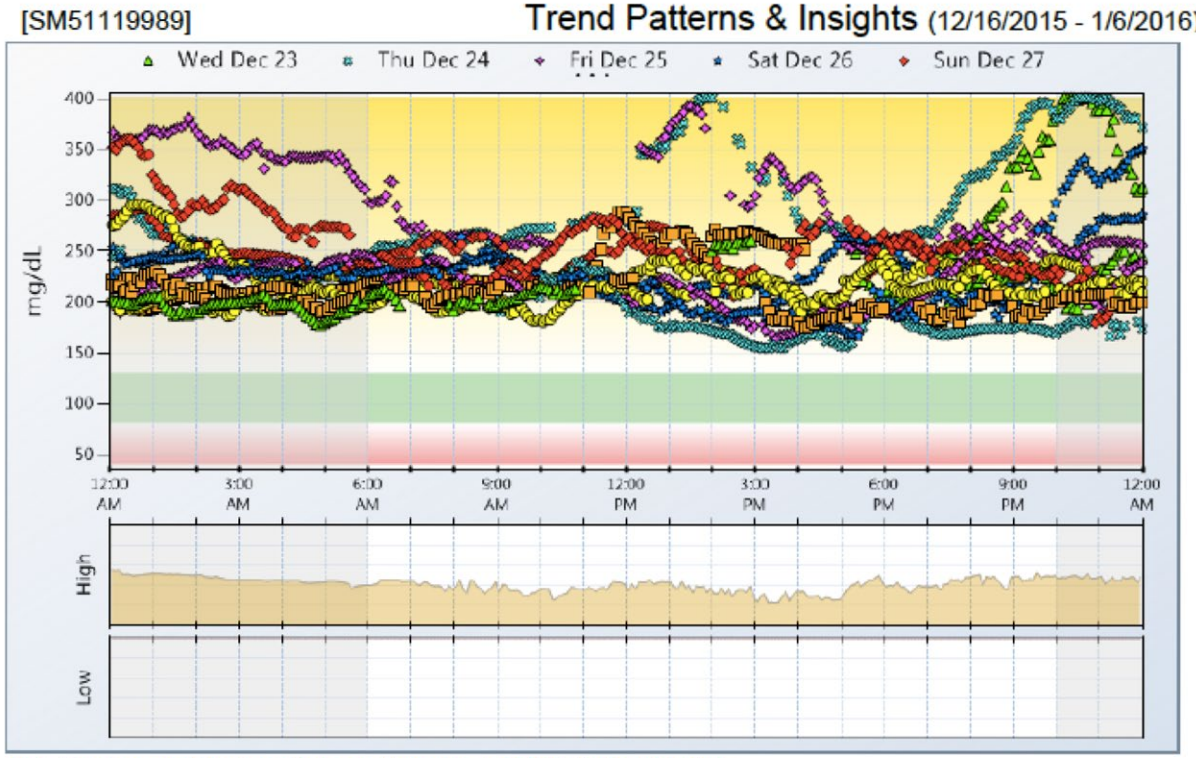
“Do I Really Need Insulin?”



Note: See above graph for other patterns as well as review any individualized considerations.

Eight Years Later

AGP Report

February 4, 2023 - February 17, 2023 (14 Days)

LibreView

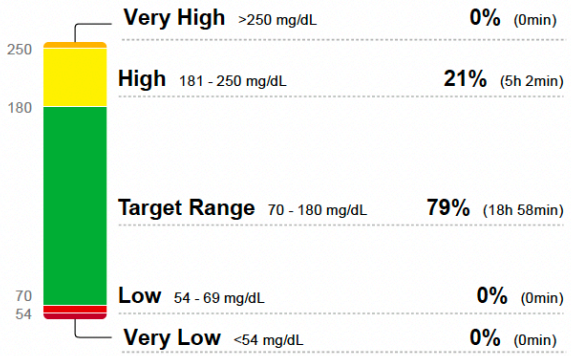
GLUCOSE STATISTICS AND TARGETS

February 4, 2023 - February 17, 2023	**14 Days**
% Time CGM is Active	**92%**

Ranges And Targets For	Type 1 or Type 2 Diabetes
Glucose Ranges Target Range 70-180 mg/dL	**Targets** % of Readings (Time/Day) 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.	

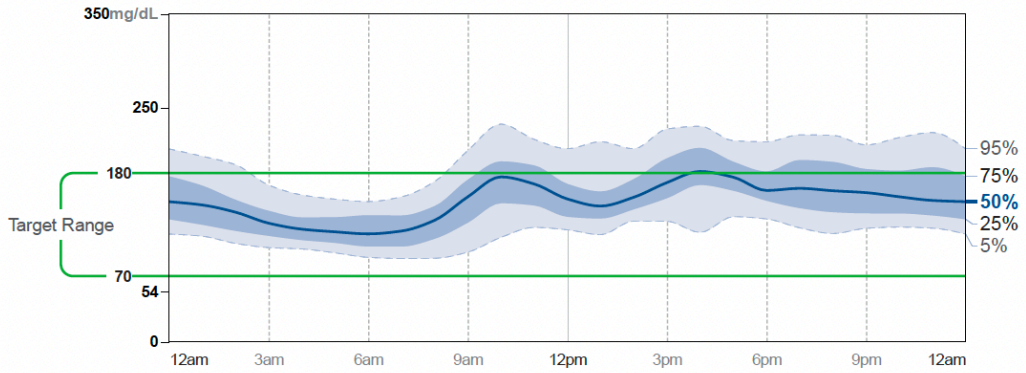
Average Glucose	**152** mg/dL
Glucose Management Indicator (GMI)	**6.9%**
Glucose Variability	**22.2%**
Defined as percent coefficient of variation (%CV)	

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 occurring in a single day.



Billing Codes for CGM/Remote Monitoring

Must enter downloaded reports into the EHR

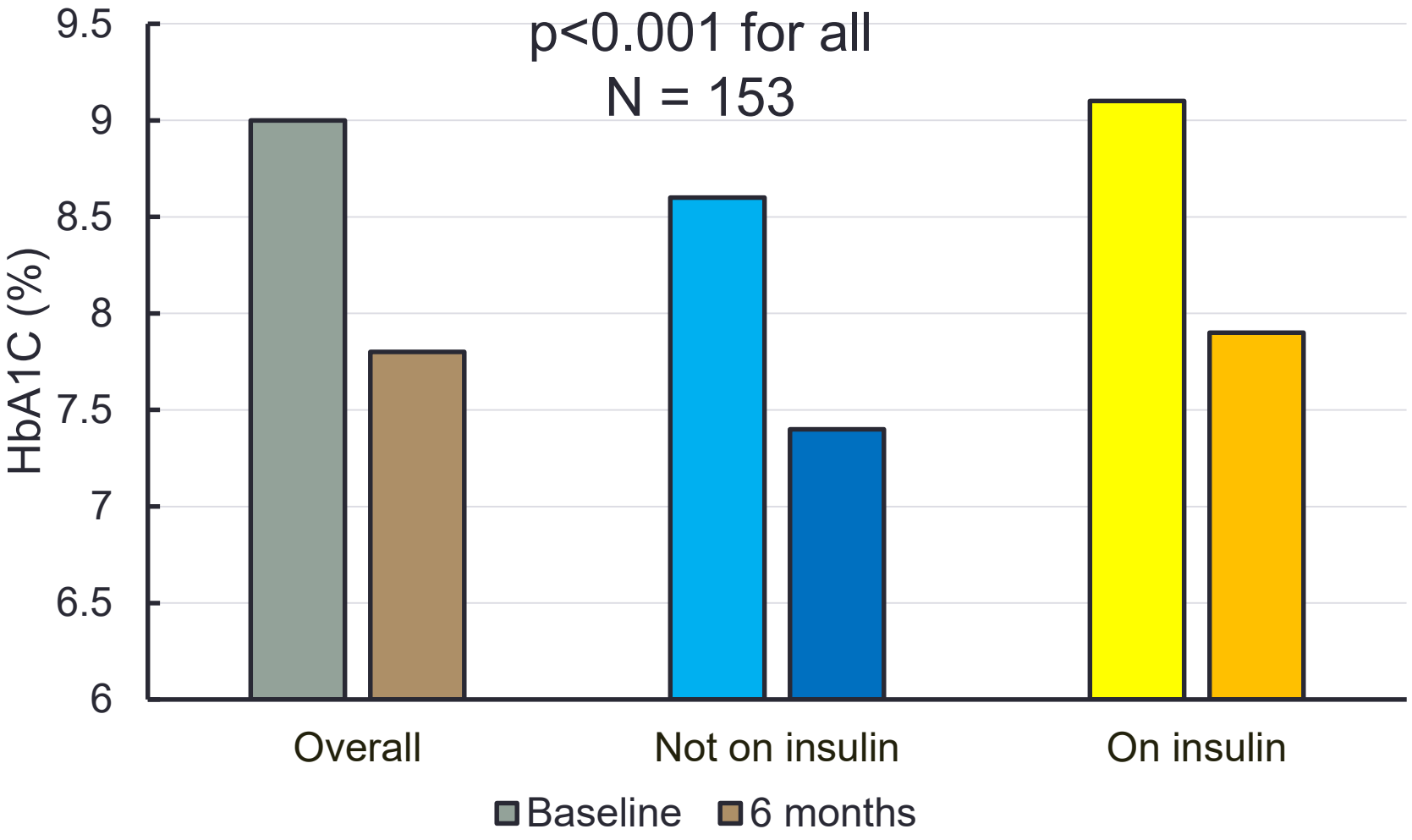
- **95251: Interpretation** of *personal or professional* CGM, requires at least 72 hours of data to be reviewed and a report by a prescribing HCP. Does not require face-to-face contact, up to 1 a month by many payors
- **95250:** Professional study – office-provided equipment, sensor placement, hook-up, calibration of monitor, patient training, removal of sensor, and printout of recording
- **95249:** Training on personal patient-provided equipment and sensor placement and initiation, once per unit
- **99091:** Collection and interpretation of physiologic data digitally stored and/or transmitted by the patient and/or caregiver to the physician or other qualified healthcare professional (QHCP), qualified by education, training, licensure/regulation (when applicable) requiring a minimum of 30 minutes

https://pro.aace.com/practice-management/cpt-codes-95249-95250-and-95251.

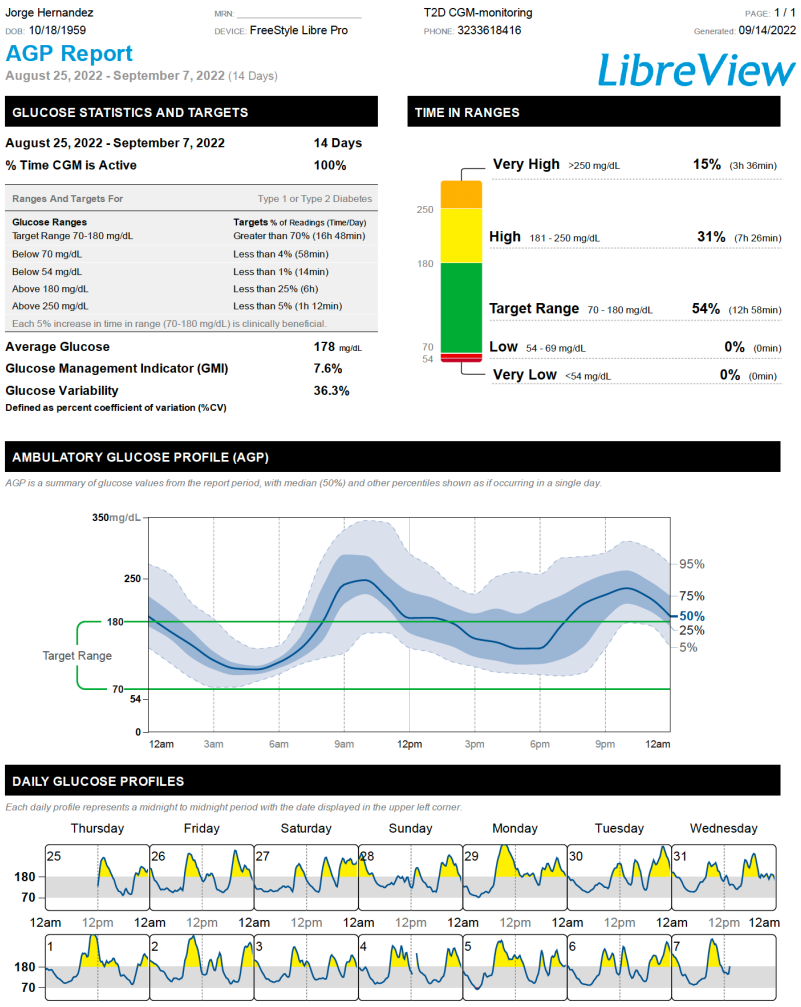
Hankey Project

- A donor from my Westside practice gave us funding to provide CGM's/CGM education and remote monitoring to anyone who wanted it at Roybal
- We tracked patients in an observational study to show outcomes
- Now we hope to get more funding to help with diabetes devices based on what is needed

Changes in A1C Levels 6 Months After Starting CGM



63 yo Latino Male at Baseline: metformin/glimepiride/empagliflozin



Jorge Hernandez
DOB: 10/18/1959
MRN:
DEVICE: FreeStyle Libre Pro

T2D CGM-monitoring
PHONE: 3233618416

PAGE: 1 / 1
Generated: 09/14/2022

AGP Report

August 25, 2022 - September 7, 2022 (14 Days)

LibreView

GLUCOSE STATISTICS AND TARGETS

August 25, 2022 - September 7, 2022	14 Days
% Time CGM is Active	100%

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	178 mg/dL
Glucose Management Indicator (GMI)	7.6%
Glucose Variability	36.3%

Defined as percent coefficient of variation (%CV)

TIME IN RANGES

Very High	>250 mg/dL	15% (3h 36min)
High	181 - 250 mg/dL	31% (7h 26min)
Target Range	70 - 180 mg/dL	54% (12h 58min)
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
Target Range
70
54
0
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.

Thursday 25 | Friday 26 | Saturday 27 | Sunday 28 | Monday 29 | Tuesday 30 | Wednesday 31

180
70
12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am

1 | 2 | 3 | 4 | 5 | 6 | 7

180
70

6 Month Follow Up: metformin, dulaglutide 0.75 mg weekly added, glimepiride reduced by 50%

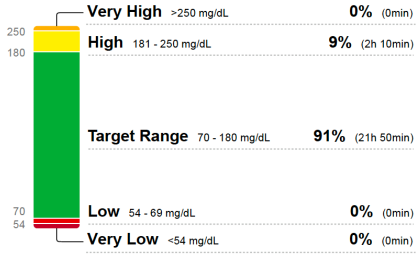
GLUCOSE STATISTICS AND TARGETS

August 7, 2023 - August 19, 2023	**13 Days**
Time CGM Active:	**100%**

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	**133** mg/dL
Glucose Management Indicator (GMI)	**6.5%**
Glucose Variability	**23.7%**
Defined as percent coefficient of variation (%CV)	

TIME IN RANGES



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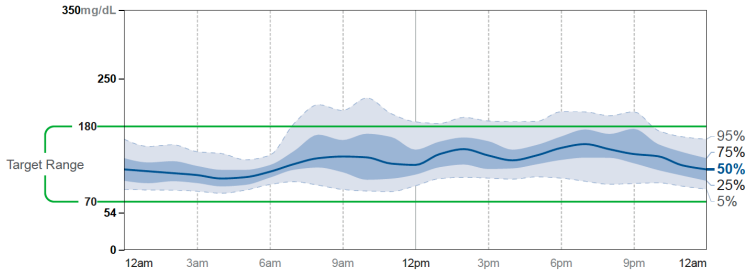

DAILY GLUCOSE PROFILES

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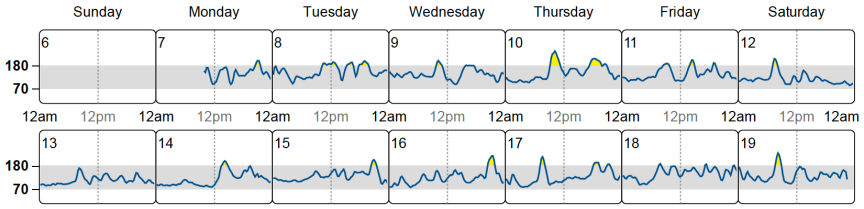
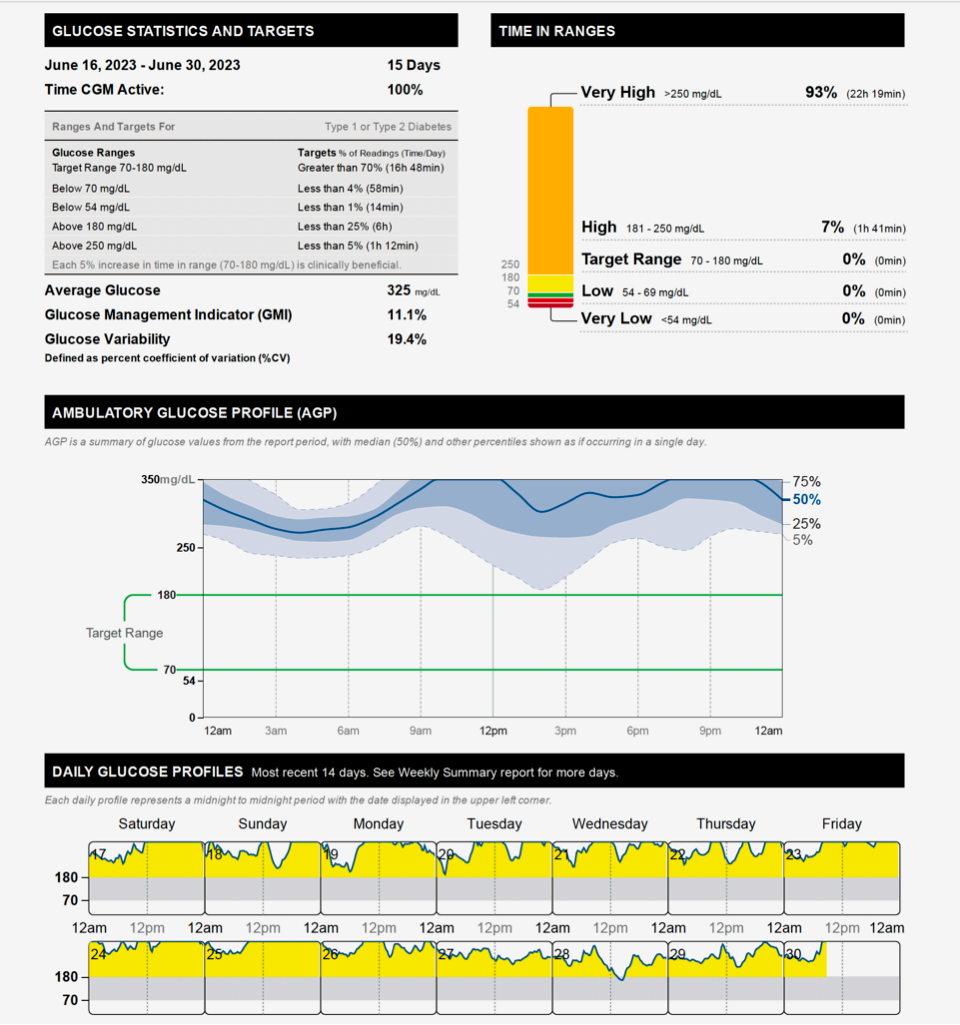


57 yo Latina Female at Baseline: On Metformin, MDI



GLUCOSE STATISTICS AND TARGETS

June 16, 2023 - June 30, 2023	15 Days
Time CGM Active:	100%

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	325 mg/dL
Glucose Management Indicator (GMI)	11.1%
Glucose Variability	19.4%
Defined as percent coefficient of variation (%CV)	

TIME IN RANGES

Very High	>250 mg/dL	93% (22h 19min)
High	181 - 250 mg/dL	7% (1h 41min)
Target Range	70 - 180 mg/dL	0% (0min)
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
75%
50%
25%
5%
12am 3am 6am 9am 12pm 3pm 6pm 9pm 12am

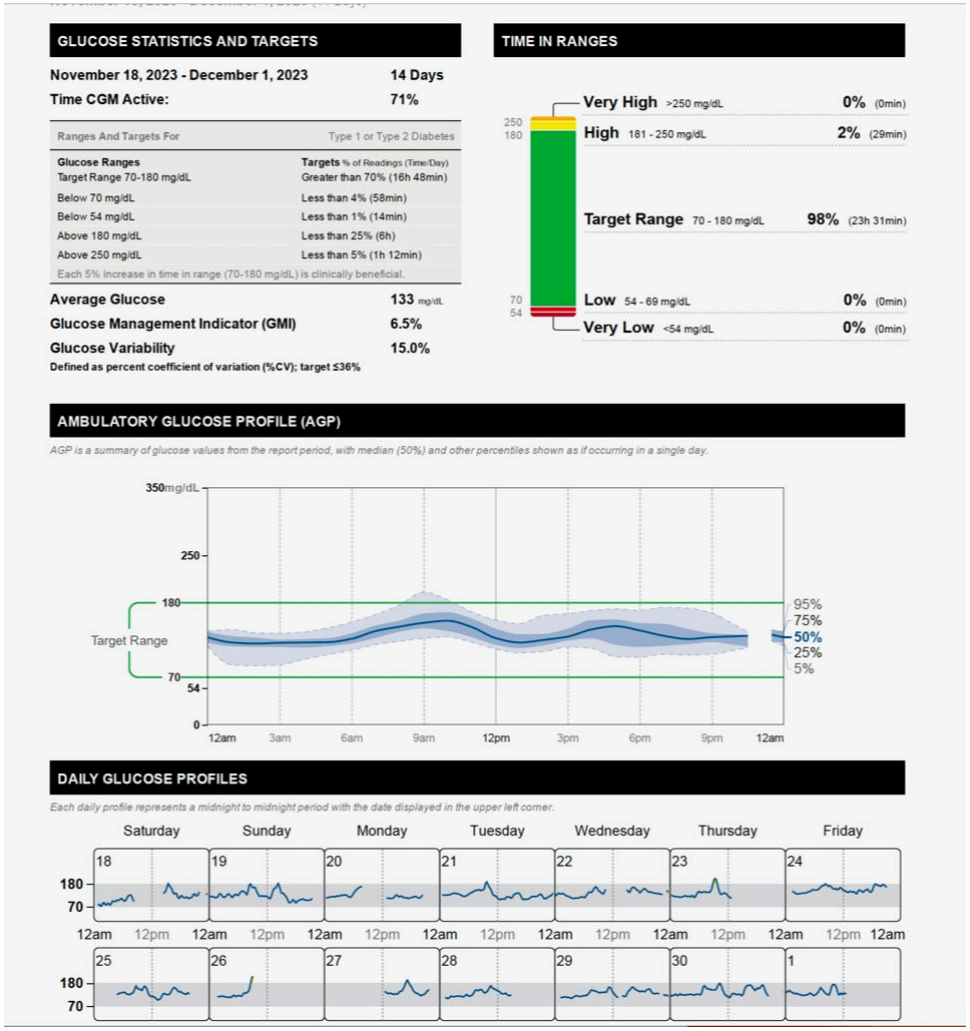
DAILY GLUCOSE PROFILES Most recent 14 days. See Weekly Summary report for more days.

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

Saturday Sunday Monday Tuesday Wednesday Thursday Friday

180
70
17 18 19 20 21 22 23
12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am 12pm 12am
180
70
24 25 26 27 28 29 30

Same Patient, 6 months later. On MDI, metformin, semaglutide



GLUCOSE STATISTICS AND TARGETS

November 18, 2023 - December 1, 2023	14 Days
Time CGM Active:	71%

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	133 mg/dL
Glucose Management Indicator (GMI)	6.5%
Glucose Variability	15.0%

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

TIME IN RANGES

Very High	>250 mg/dL	0% (0min)
High	181 - 250 mg/dL	2% (29min)
Target Range	70 - 180 mg/dL	98% (23h 31min)
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.

De-Intensifying

- 72 yo Latina female
- Diabetes x 26 years
- Some dementia
- Lean BMI = 20.3
- Recently found to have Cpeptide = 0.13 BG = 156
- On insulin x 10 years
- Had osteo of left foot; s/p Left BKA
- eGFR = 90
- On 15 glargine qhs. 70 – 100 3 units/120 – 180 10 units/190 – 300 15 units; metformin 1 gm BID

GLUCOSE STATISTICS AND TARGETS

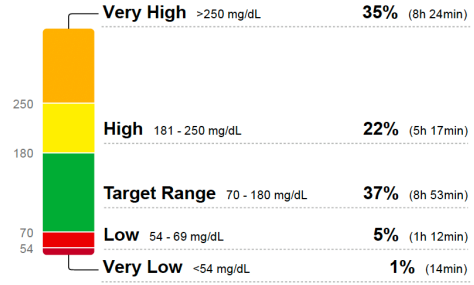
December 23, 2023 - January 5, 2024	**14 Days**
Time CGM Active:	**44%**

Ranges And Targets For	Type 1 or Type 2 Diabetes
Glucose Ranges Target Range 70-180 mg/dL	**Targets** % of Readings (Time/Day) 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	**208** mg/dL
Glucose Management Indicator (GMI)	**-**
Glucose Variability	**47.9%**

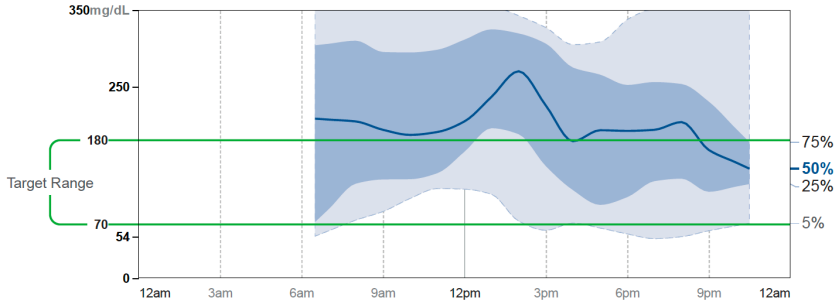
Defined as percent coefficient of variation (%CV); target ≤36%

TIME IN RANGES



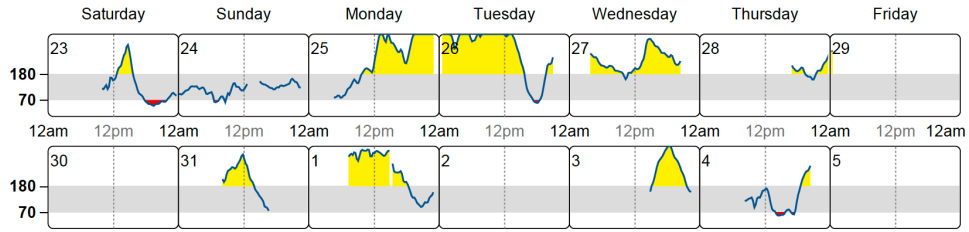
AMBULATORY GLUCOSE PROFILE (AGP)

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



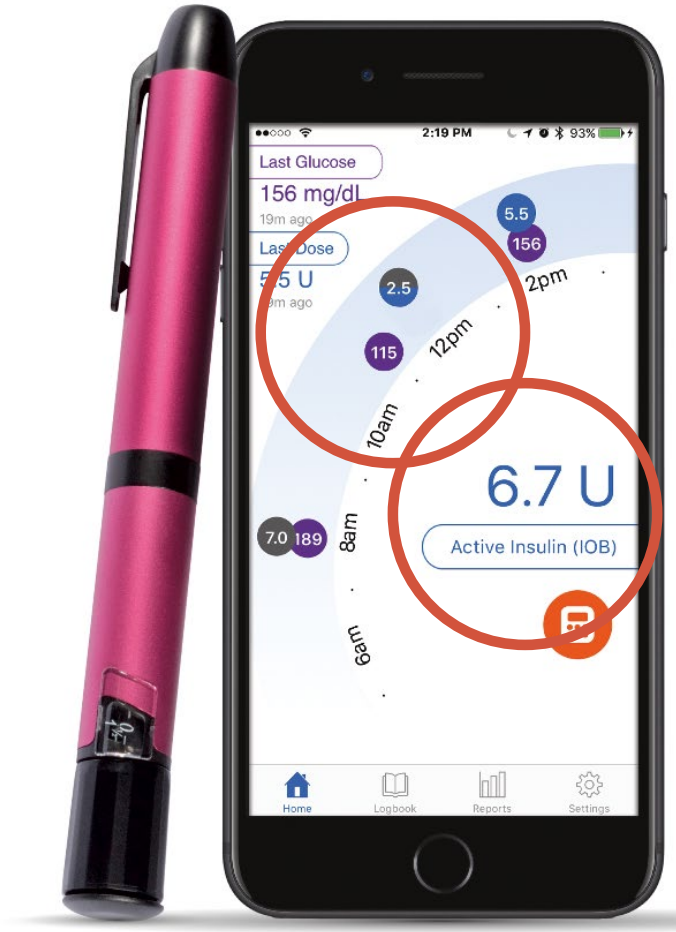
Changes

- Stopped the metformin
- Continue glargine (given every evening by her granddaughter)
- Change B/L insulin to 5 units of RAA—given by patient on her own much of the time. To hold insulin if below 100 and/or not eating.
- Predinner correction scale given (family member present for dinner)

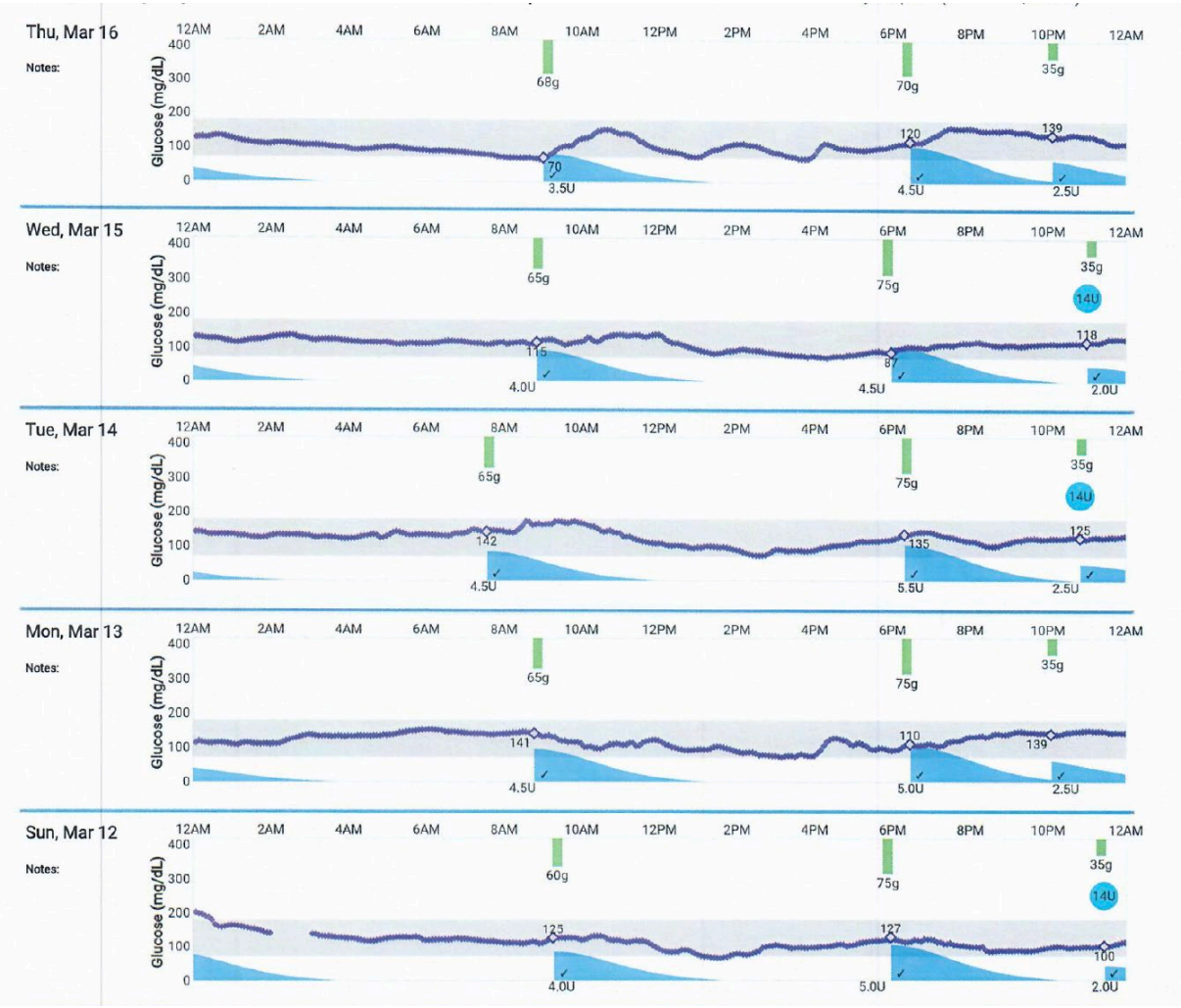
General Philosophy

- I tend to taper up and down, never stopping suddenly unless worrisome hypoglycemia
- My insulin dose adjustments are generally on the order of 10 – 20% up and down
- My oral medication adjustments are by 50%--e.g. from 1000 mg BID of metformin to 500 mg BID or 4 mg to 2 mg of glimepiride—you never now how much a drug is helping until you change the dose
- Close follow up during periods of dose adjustment is the key to success
- Be sure reinforce prevention/treatment of hypos and when to contact

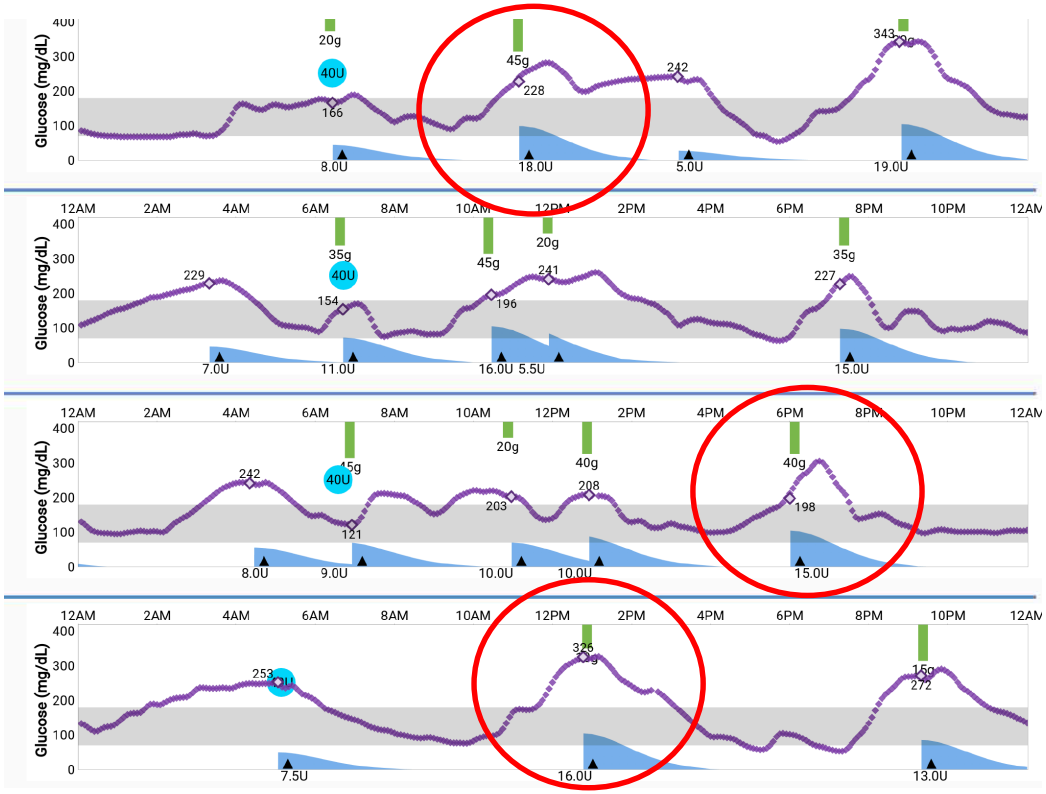
Connected Insulin Pen: A Pen for Giving Insulin that Collects Data



Timing is Everything: Carb Doses Before Eating

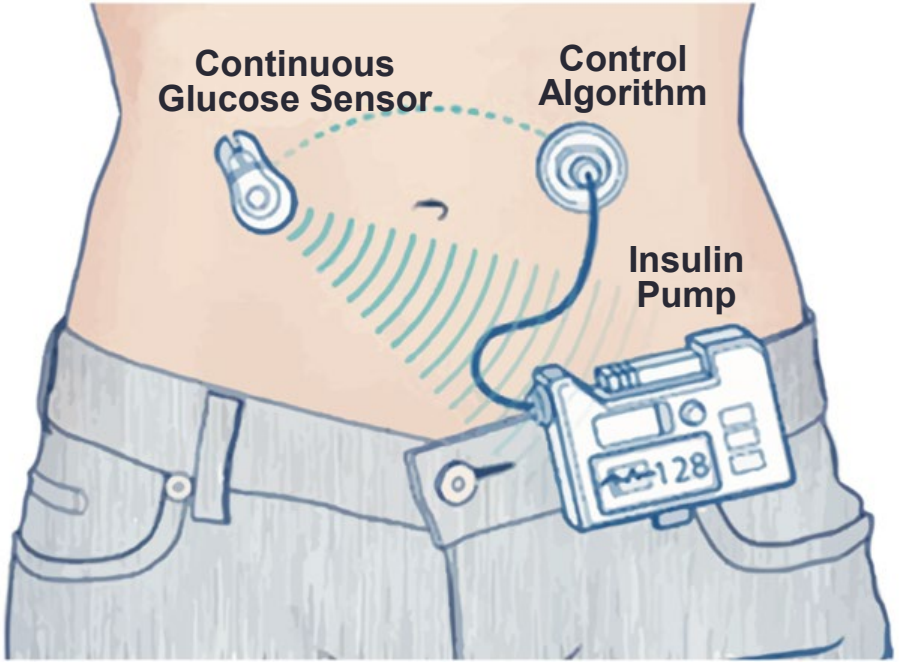


Time is Everything: Carb Doses during/after Eating



Automated Insulin Delivery Systems

Medtronic Systems, Tandem Systems, Omnipod 5, iLet and DIY Systems

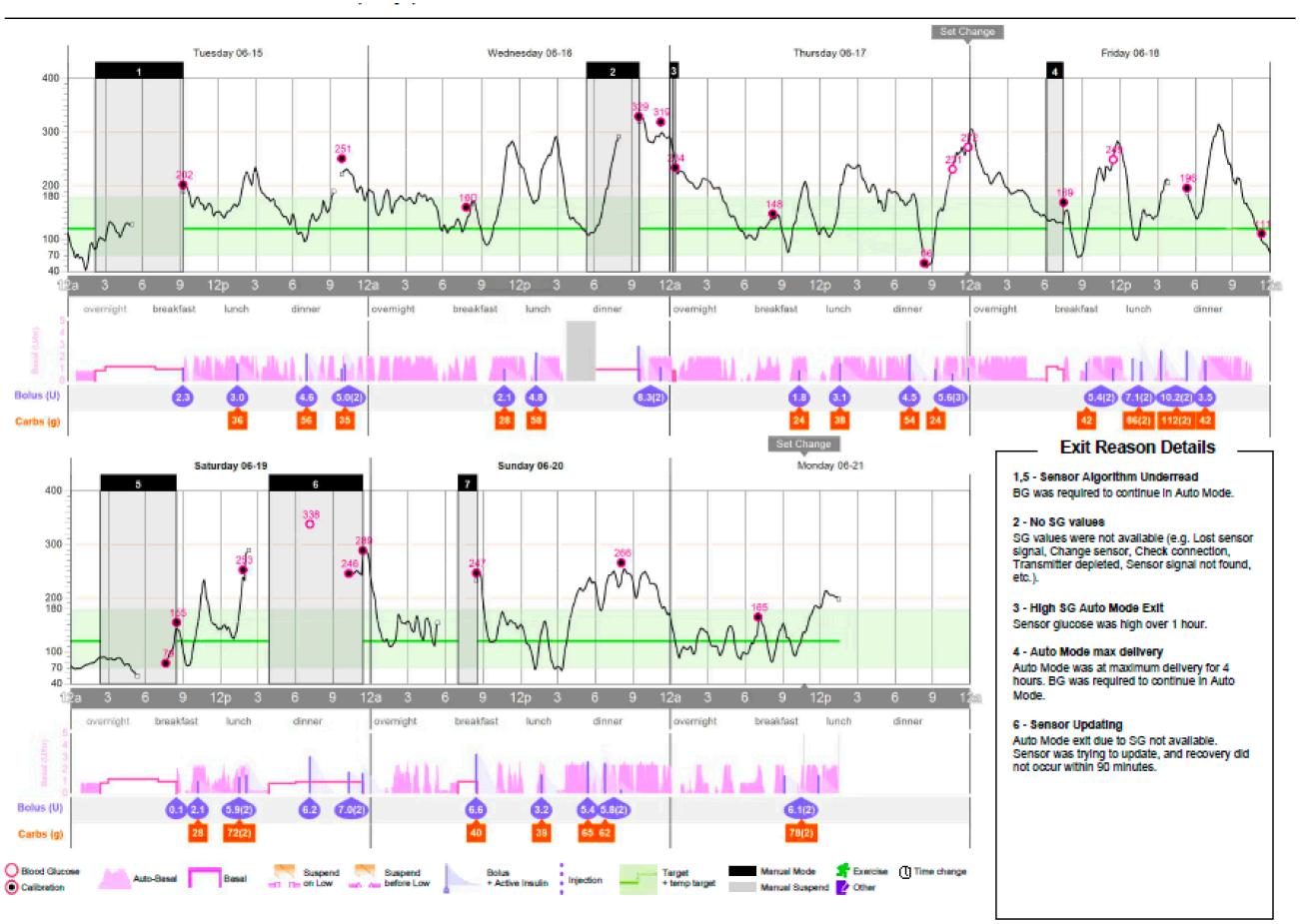


Medtronic 780G

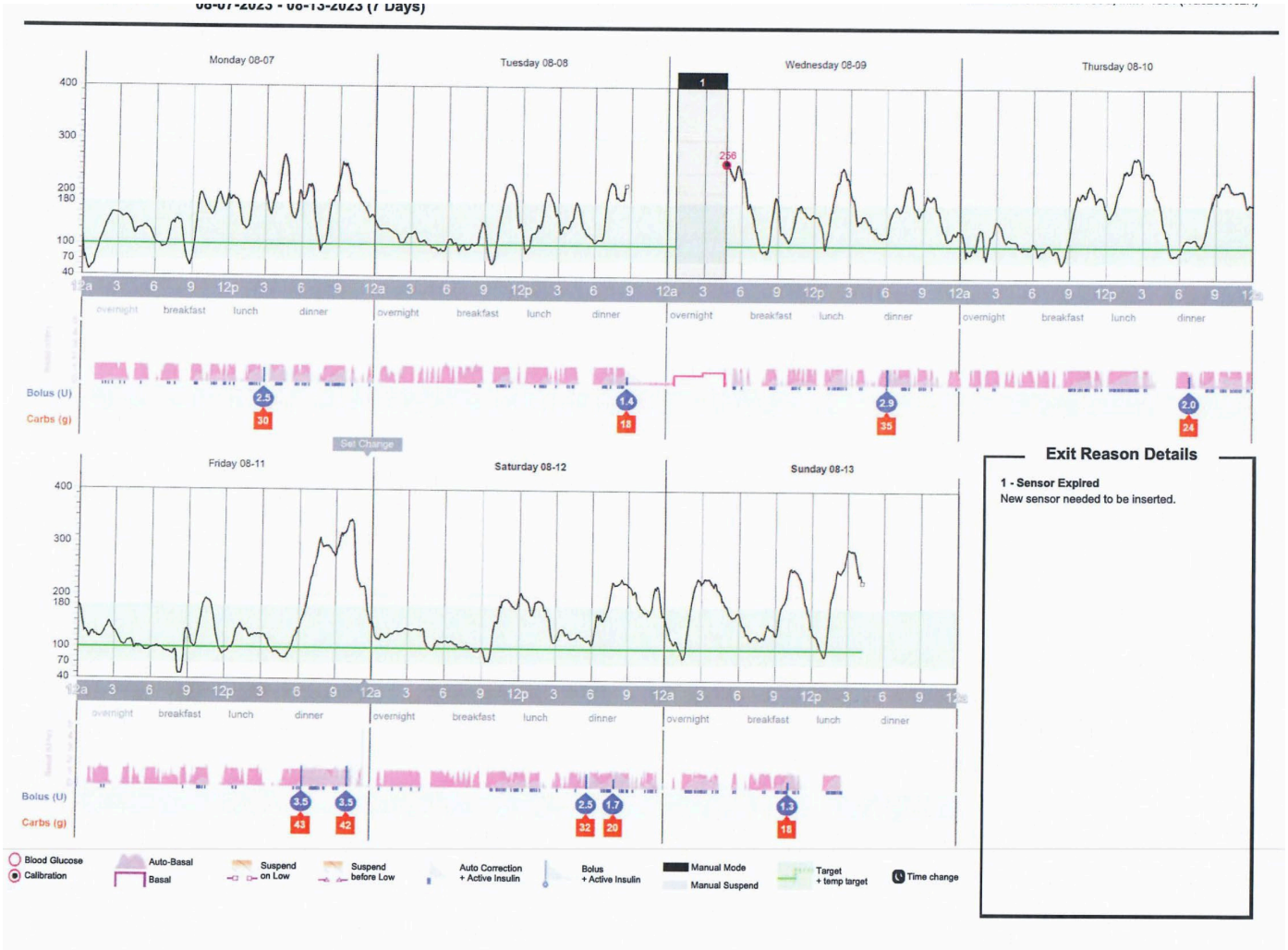
New Features:

1. Guardian 4 sensor which does not require calibration in automode
2. Seven-day infusion set
3. Can set target as low as 100 mg/dl
4. Gives correction bolus doses every 5 minutes
5. On the market for 3 years in Europe—strong data to support its use

670G Data


Tuesday 06-15
Wednesday 06-16
Thursday 06-17
Friday 06-18
Set Change
overnight
breakfast
lunch
dinner
Bolus (U)
Carbs (g)
Saturday 06-19
Sunday 06-20
Monday 06-21
Exit Reason Details
1,5 - Sensor Algorithm Underread
BG was required to continue in Auto Mode.
2 - No SG values
SG values were not available (e.g. Lost sensor signal, Change sensor, Check connection, Transmitter depleted, Sensor signal not found, etc.).
3 - High SG Auto Mode Exit
Sensor glucose was high over 1 hour.
4 - Auto Mode max delivery
Auto Mode was at maximum delivery for 4 hours. BG was required to continue in Auto Mode.
6 - Sensor Updating
Auto Mode exit due to SG not available. Sensor was trying to update, and recovery did not occur within 90 minutes.
Blood Glucose
Calibration
Auto-Basal
Basal
Suspend on Low
Suspend before Low
Bolus + Active Insulin
Injection
Target + temp target
Manual Mode
Manual Suspend
Exercise
Other
Time change

780G Data

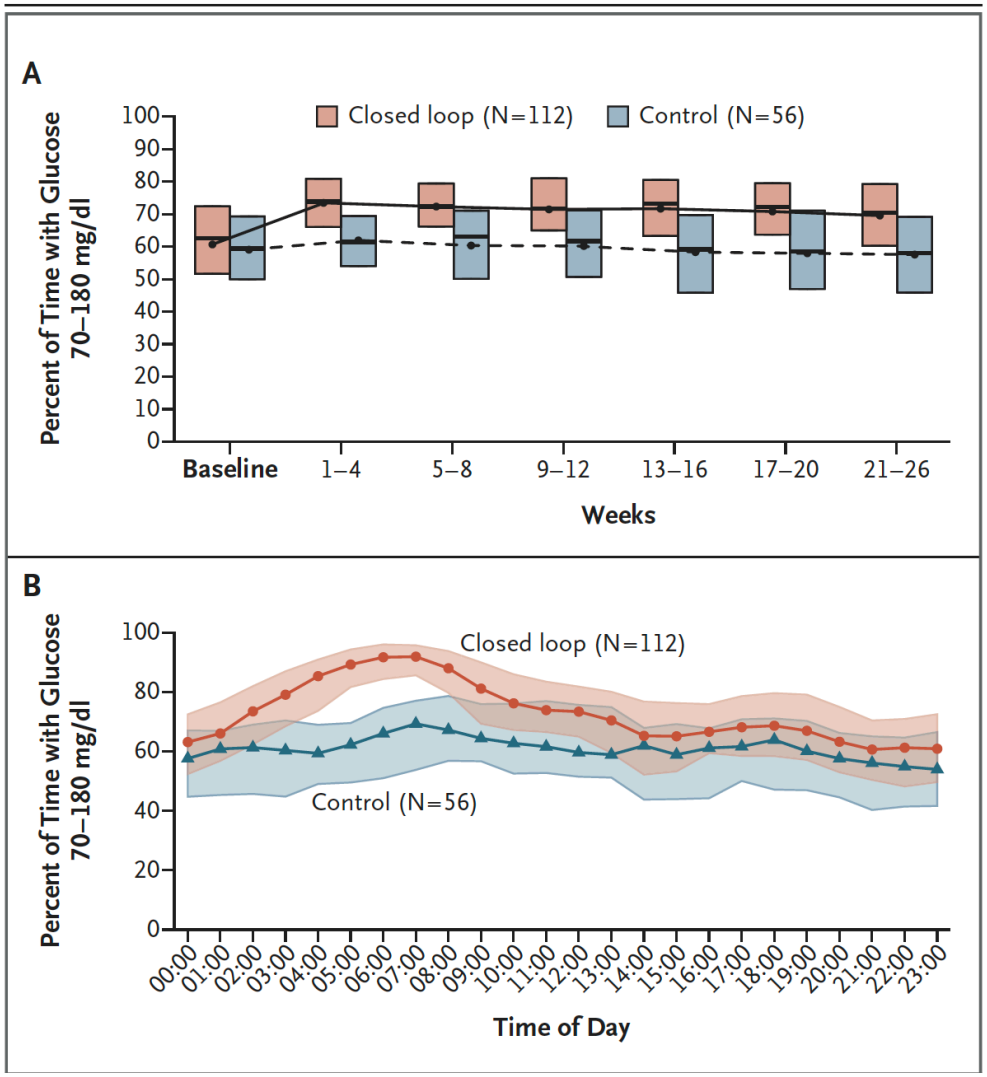

Monday 08-07
Tuesday 08-08
Wednesday 08-09
Thursday 08-10
Friday 08-11
Saturday 08-12
Sunday 08-13
Bolus (U)
Carbs (g)
Exit Reason Details
1 - Sensor Expired
New sensor needed to be inserted.
Blood Glucose
Calibration
Auto-Basal
Basal
Suspend on Low
Suspend before Low
Auto Correction + Active Insulin
Bolus + Active Insulin
Manual Mode
Manual Suspend
Target + temp target
Time change

T:slim X2 with Control-IQ Technology

- Can set basal rates, correction and carb doses
- Gives autocorrect boluses
- Can give bolus doses from a smart phone

Tandem Mobi Pump

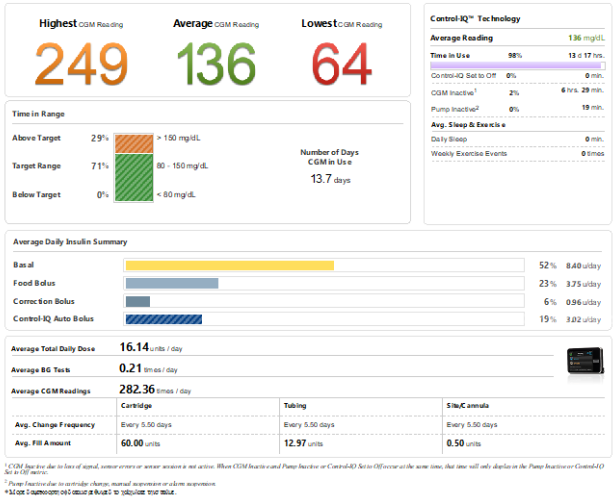
AID vs Sensor Augmented Pump



A1C reduced from ~7.4 to ~7.0% p=0.001

N Engl J Med 2019; 381:1707-1717 DOI: 10.1056/NEJMoa1907863

East LA Patient with T1D on AID System



Highest CGM Reading	Average CGM Reading	Lowest CGM Reading
249	136	64

Time in Range

Above Target	29%	> 150 mg/dL
Target Range	71%	80 - 150 mg/dL
Below Target	0%	< 80 mg/dL

Number of Days CGM in Use: 13.7 days

Control-IQ™ Technology

Average Reading		136 mg/dL
Time in Use	98%	13 d 17 hrs.
Control-IQ Set to Off	0%	0 min.
CGM Inactive[1]	2%	6 hrs. 29 min.
Pump Inactive[2]	0%	19 min.

Avg. Sleep & Exercise

Daily Sleep	0 min.
Weekly Exercise Events	0 times

Average Daily Insulin Summary

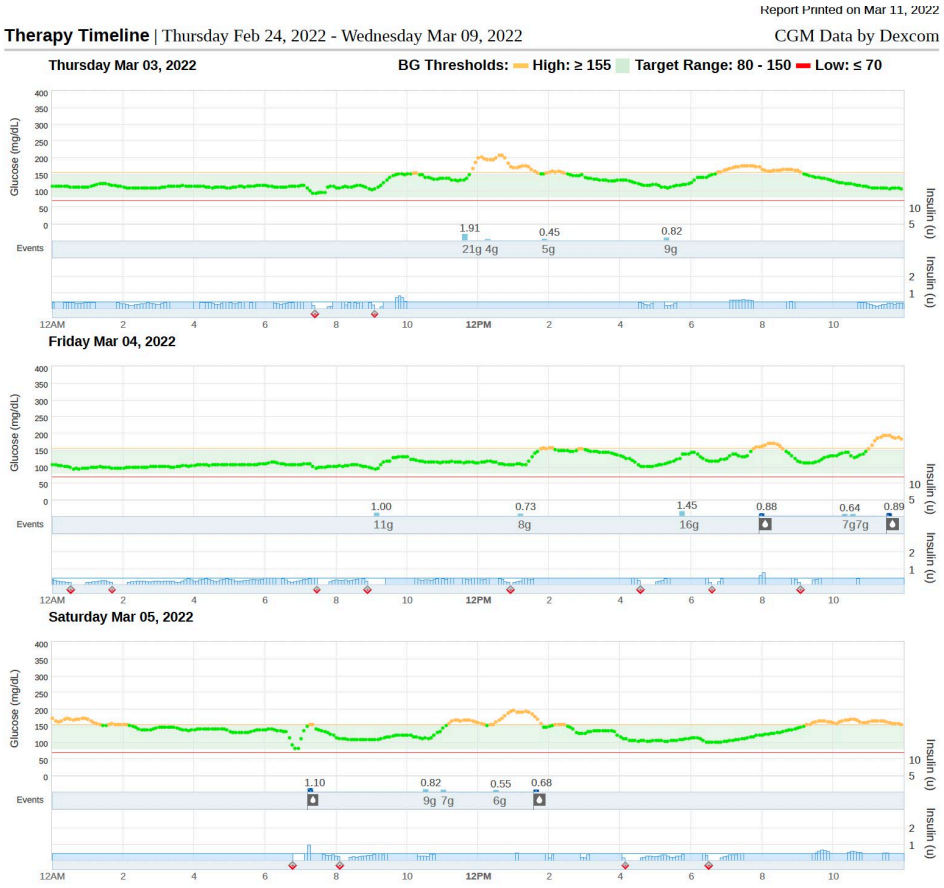
Basal	52%	8.40 u/day
Food Bolus	23%	3.75 u/day
Correction Bolus	6%	0.96 u/day
Control-IQ Auto Bolus	19%	3.02 u/day

Average Total Daily Dose	16.14 units / day
Average BG Tests	0.21 times / day
Average CGM Readings	282.36 times / day

	Cartridge	Tubing	Site/Cannula
Avg. Change Frequency	Every 5.50 days	Every 5.50 days	Every 5.50 days
Avg. Fill Amount	60.00 units	12.97 units	0.50 units

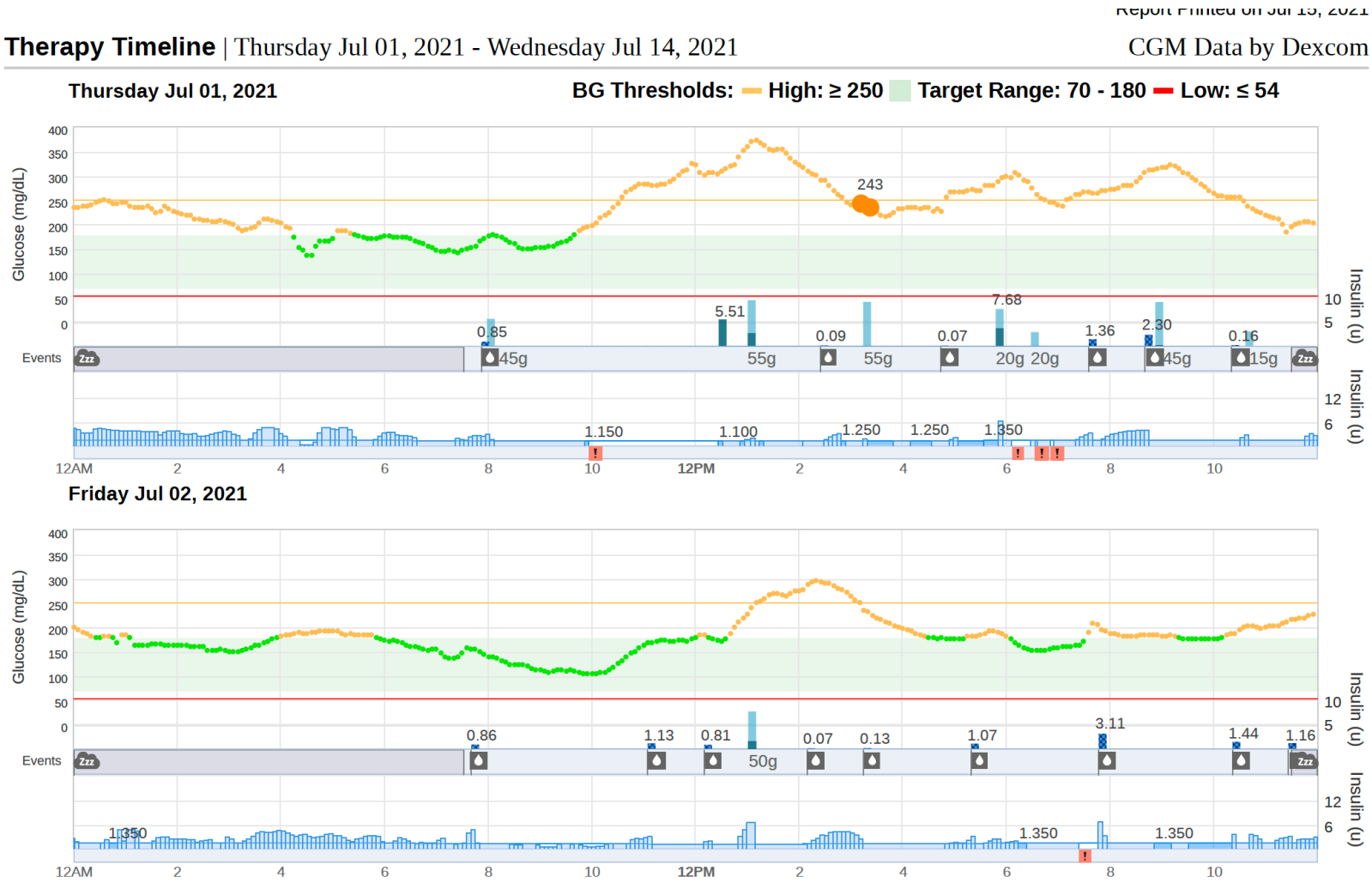
[1] CGM Inactive due to loss of signal, sensor errors or sensor session is not active. When CGM Inactive and Pump Inactive or Control-IQ Set to Off occur at the same time, that time will only display in the Pump Inactive or Control-IQ Set to Off metric.

[2] Pump Inactive due to cartridge change, manual suspension or alarm suspension.



Data from an AID System

Busy Mom Forgets/Delays PreMeal Bolus Doses



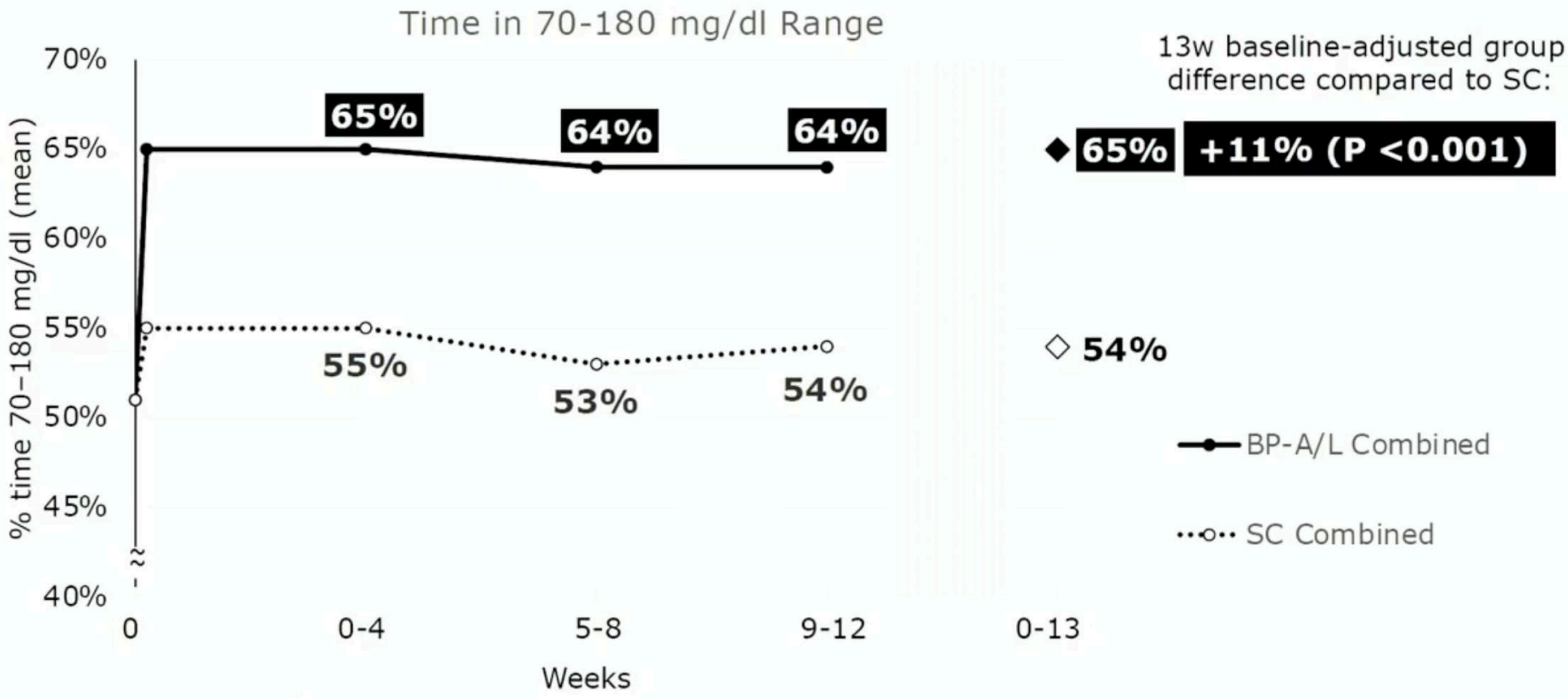
The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 SEPTEMBER 29, 2022 VOL. 387 NO. 13

Multicenter, Randomized Trial of a Bionic Pancreas in Type 1 Diabetes

Bionic Pancreas Research Group*

Mean TIR Increased by 2.6 Hours per Day



Tubeless AID System: Omnipod 5

Brown S et al;. Safety Evaluation of the Omnipod 5 Automated Insulin Delivery System over 3 Months of Use in Adults and Adolescents with Type 1 Diabetes. Presented at Virtual Endocrine Society Annual Meeting; 2021.

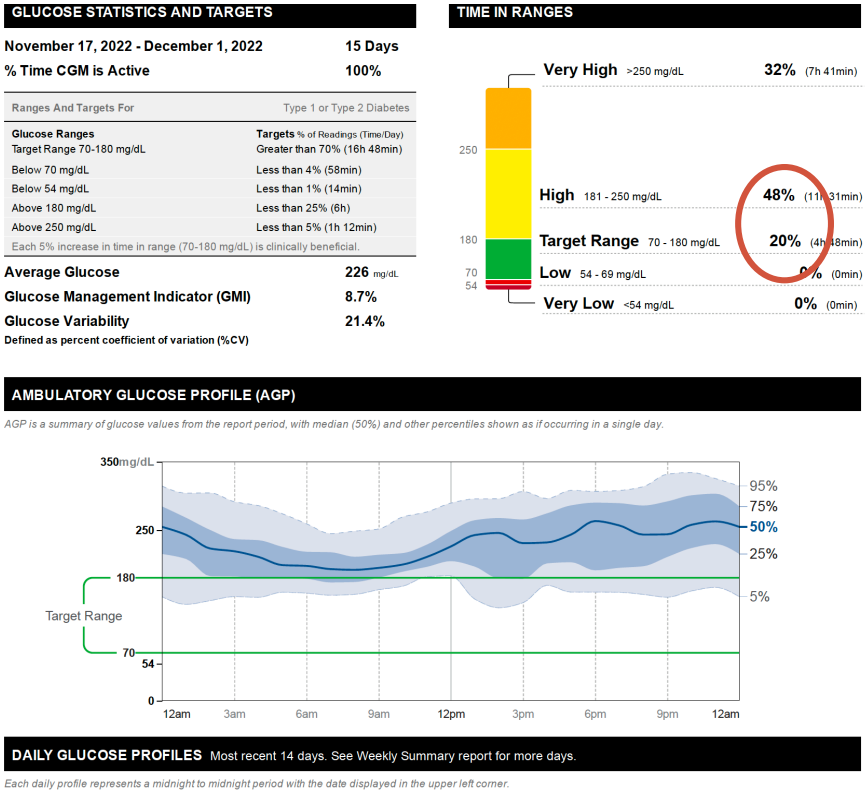
Diabetes Care
American Diabetes Association

Safety and Efficacy of the Omnipod 5 Automated Insulin Delivery System in Adults With Type 2 Diabetes: From Injections to Hybrid Closed-Loop Therapy

Georgia M. Davis, Anne L. Peters, Bruce W. Bode, Anders L. Carlson, Bonnie Dumais, Todd E. Vienneau, Lauren M. Huyett, and Trang T. Ly

Diabetes Care 2023;46(4):742–750 | *https://doi.org/10.2337/dc22-1915*

32 yo Female Seasonal Worker with T2DM on MDI, semaglutide, metformin



GLUCOSE STATISTICS AND TARGETS

November 17, 2022 - December 1, 2022	15 Days
% Time CGM is Active	100%

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	**226** mg/dL
Glucose Management Indicator (GMI)	**8.7%**
Glucose Variability	**21.4%**
Defined as percent coefficient of variation (%CV)	

TIME IN RANGES

Very High	>250 mg/dL	**32%** (7h 41min)
High	181 - 250 mg/dL	**48%** (11h 31min)
Target Range	70 - 180 mg/dL	**20%** (4h 48min)
Low	54 - 69 mg/dL	**0%** (0min)
Very Low	<54 mg/dL	**0%** (0min)

250
180
70
54

AMBULATORY GLUCOSE PROFILE (AGP)

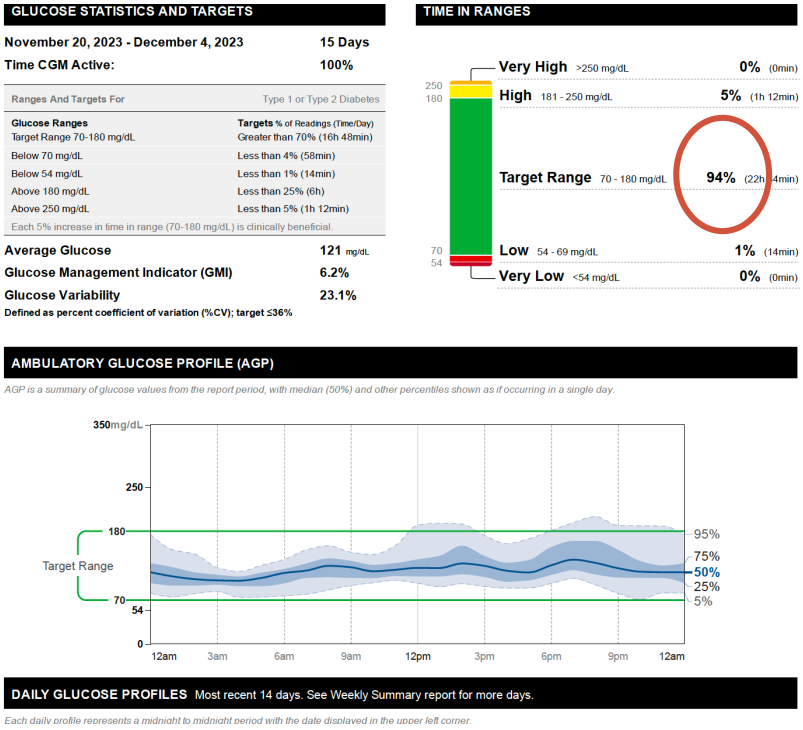
AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if occurring in a single day.

350mg/dL
250
180
Target Range
70
54
0
12am 3am 6am 9am 12pm 3pm 6pm 9pm 12am
95%
75%
50%
25%
5%

DAILY GLUCOSE PROFILES Most recent 14 days. See Weekly Summary report for more days.

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

Two Months After Starting Omnipod5



GLUCOSE STATISTICS AND TARGETS

November 20, 2023 - December 4, 2023	15 Days
Time CGM Active:	100%

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	121 mg/dL
Glucose Management Indicator (GMI)	6.2%
Glucose Variability	23.1%

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

TIME IN RANGES

250
180
70
54

Very High	>250 mg/dL	0% (0min)
High	181 - 250 mg/dL	5% (1h 12min)
Target Range	70 - 180 mg/dL	94% (22h 4min)
Low	54 - 69 mg/dL	1% (14min)
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 Most recent 14 days. See Weekly Summary report for more days.

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

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HOME | RESOURCES | DEVICE TYPE | PUBLICATIONS | ABOUT

Device Comparison Chart

Using the **C|A|R|E|S Framework**, learn how each device: **CALCULATES** insulin delivery; which pump settings the user can **ADJUST**; when it **REVERTS** to open loop; how to best **EDUCATE**; and **SENSOR/SHARE** characteristics.

[LAST UPDATED: JULY 2022]

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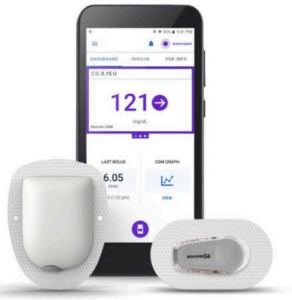
MiniMed 670G / 770G	MiniMed 780G	t:slim X2 Control-IQ	Omnipod 5
			

https://www.bdcpantherdiabetes.org/device-comparison

Conclusions

- Technology can help people with both T1DM and T2DM
- Education and follow-up are vital
- Data downloading is necessary for interpretation
- Access is increasing for many of our patients, although can still be a barrier

Thank You

annepete@med.usc.edu