Continuous Glucose Monitors in Practice

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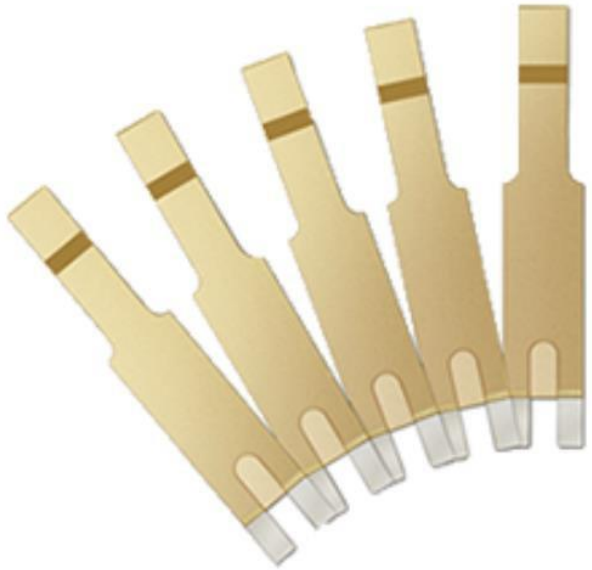
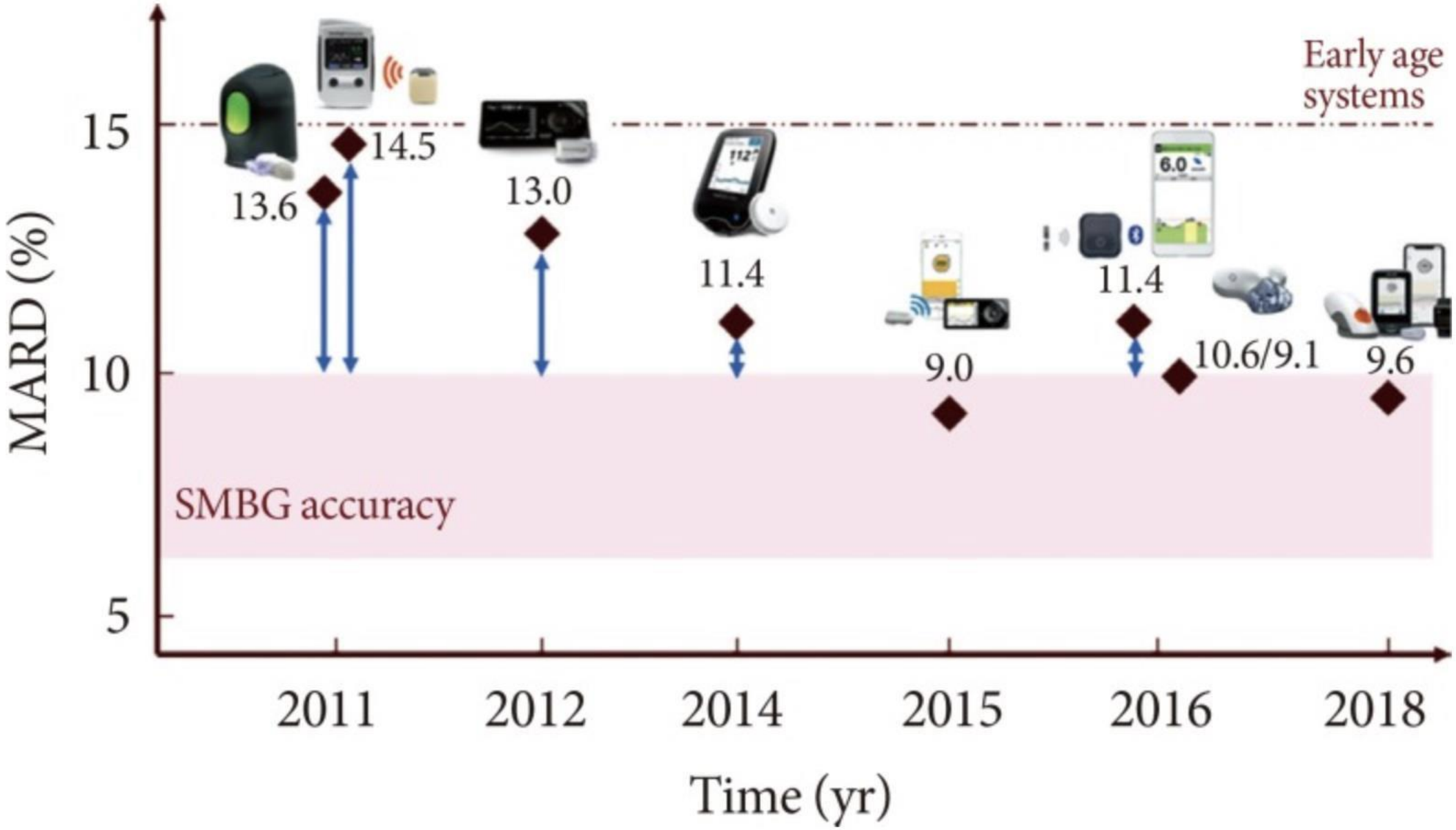
Duality of Interest

- Research funding: Abbott, Allergan, Corcept, Eli Lilly, Novo Nordisk
- Consultant: Abbott, Novo Nordisk, Biomea
- Speakers bureau: Eli Lilly, Novo Nordisk

History



Accuracy of CGM is approaching that of SMBG



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2023

Advantages and Disadvantages of SMBG

ADVANTAGES

- Accurately measures capillary glucose (with proper technique)
- Relatively inexpensive
- Easy for patients to learn
- Widely used
- People are [illegible] with it

DISADVAN[illegible]

- Training [illegible]
- B[illegible] user error
- Data limited to single point in time
- Requires multiple tests per day for effective clinical use
- Inconvenient and painful
- Quality of strip/meters vary

Fewer than 1/3 of people with diabetes adhere to the recommended amount of SMBG testing

a. [illegible]gan R, et al. *Adv Ther*. 2019;36:579-596; b. American Diabetes Association. *Diabetes Care*. 2021;44(Suppl 1):S85-S99.

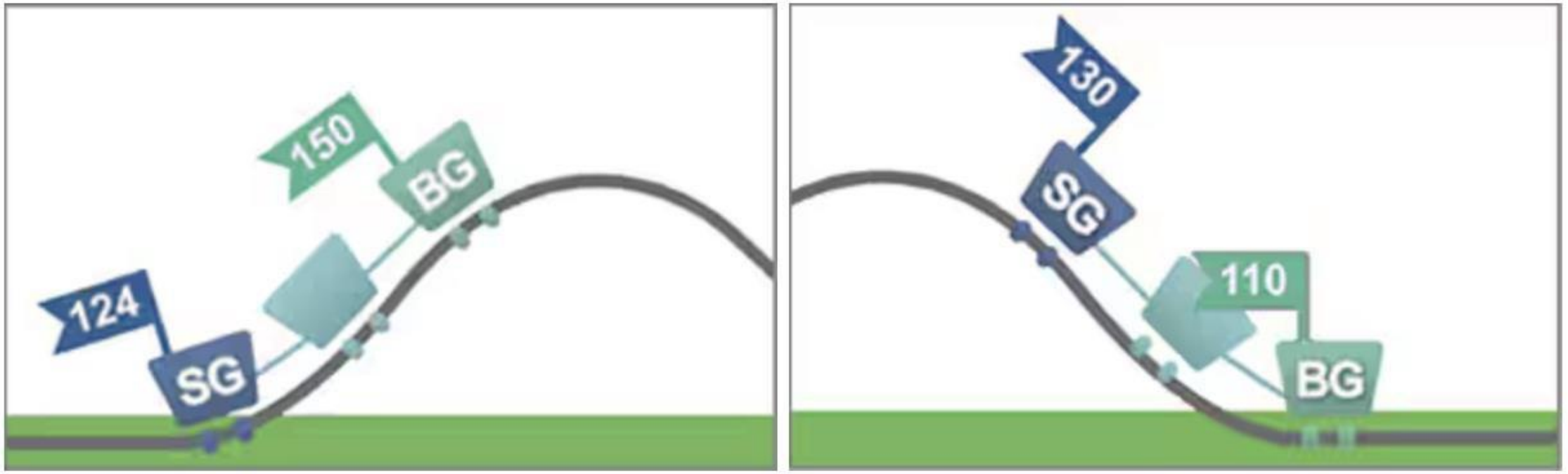
Poor Testing Technique Can Negatively Affect Accuracy

- Median blood glucose levels measured by portable analyzer in 10 volunteers with normal glucose tolerance after peeling fruit, followed by washing hands with tap water, cleaning fingertip with alcohol wipe, or no action
- Skin contaminants reduce meter accuracy 1 hr after peeling fruit

Median Blood Glucose, mg/dL	Washed Hands	Exposed Finger (No Washing)	1 Alcohol Wipe	5 Alcohol Wipes
Peeling an orange (n = 10)	90	171	118	119
Peeling a grape (n = 10)	87	360	274	131
Peeling a kiwi (n = 10)	92	183	144	106

Hirose. Diabetes Care. 2011;34:596.

Glucose entry into the Interstitial Glucose from Blood Takes about 15 minutes (Lag Time)



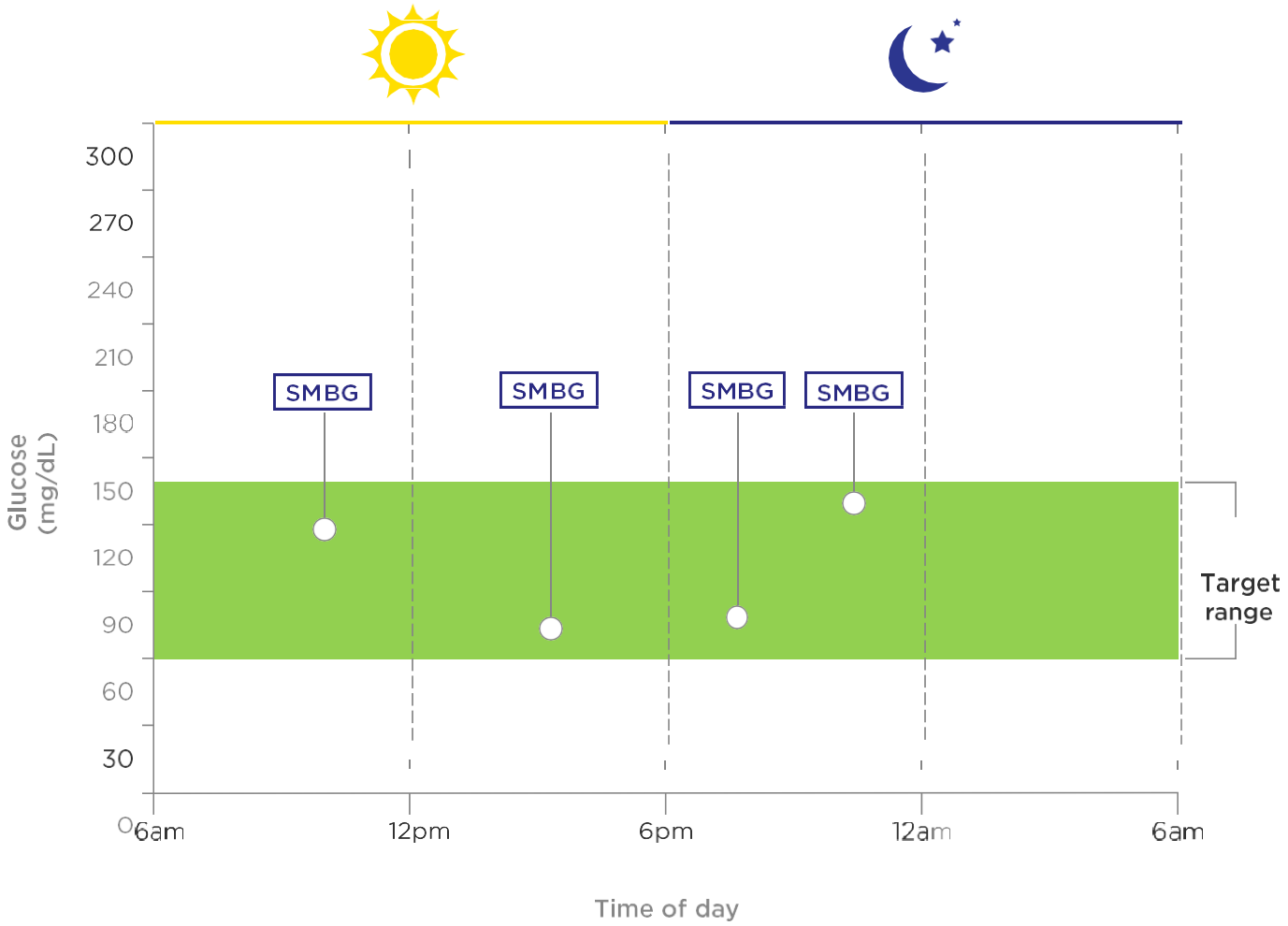
How CGM Can Help Reduce Diabetes Management Challenges

Self-monitoring of blood glucose (SMBG) limitations

Even with multiple daily fingersticks, SMBG can leave highs & lows undetected[1]

Patients using SMBG could be spending significant time outside of range

SMBG only provides readings for a single point in time



Not actual patient data; for illustrative purposes only.

1. Janapala Rajesh Naidu, et al. "Continuous Glucose Monitoring Versus Self-monitoring of Blood Glucose in Type 2 Diabetes Mellitus: A Systematic Review with Meta-analysis." *Cureus* 11, no. 9 (September 2019): e5634.

How CGM Can Help Reduce Diabetes Management Challenges

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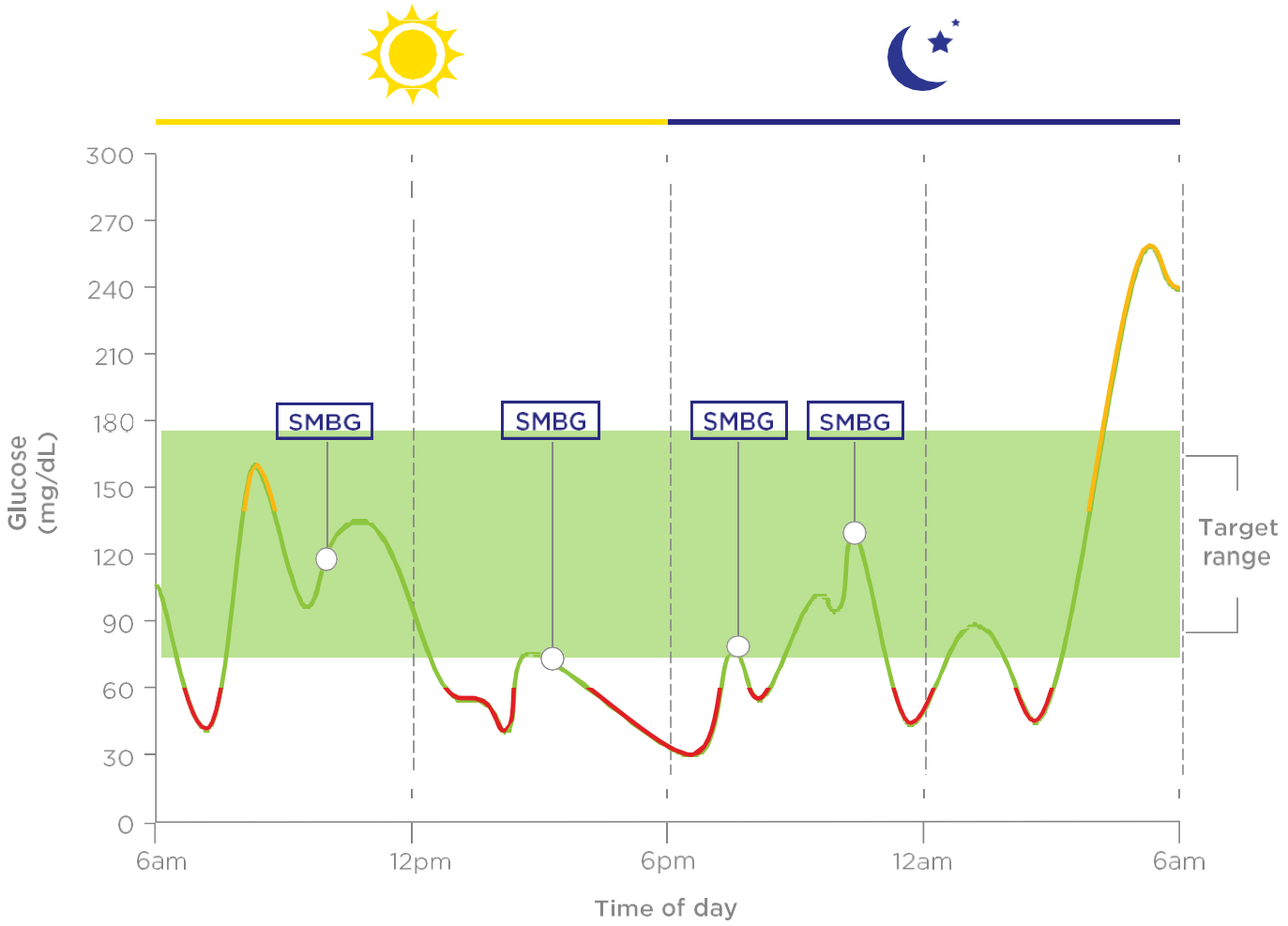


Not actual patient data; for illustrative purposes only.

Limitations to A1C

Check for updates

TIVES IN CARE

The Fallacy of Average: How Using HbA_{1c} Alone to Assess Glycemic Control Can Be Misleading

Diabetes Care 2017;40:994–999 | https://doi.org/10.2337/dc17-0636

Roy W. Beck,[1] Crystal G. Connor,[1] Deborah M. Mullen,[2] David M. Wesley,[2,3] and Richard M. Bergenstal[2]

- It is a surrogate marker
- Based on an average, without information on glycemic variability
- Factors that affect red blood cell turnover can make this inaccurate
- Anemia and other conditions may falsely elevate or decrease
- Large interindividual variability

HbA1c, %	mg/dL	95% CI
5	97	(76 to 120)
6	126	(100 to 152)
7	154	(123 to 185)
8	183	(147 to 217)
9	212	(170 to 249)
10	240	(193 to 282)
11	269	(217 to 314)
12	298	(240 to 347)

Beck. Diabetes Care. 2017;40:994.

Personal Continuous Glucose Monitoring Devices

Dexcom G6 CGM System

Dexcom G7 CGM System

FreeStyle Libre 2 CGM System

FreeStyle Libre 3 CGM System

Guardian Connect CGM Sensor

Guardian Sensor 3 with Guardian Link 3 Transmitter

Eversense E3 CGM System

https://consumerguide.diabetes.org/
https://www.diabeteseducator.org/danatech

New Sensors

- Simplera (Medtronic)
  - Free standing
  - Connected to In Pen
- Freestyle Libre 2 plus and 3 plus
  - Free standing
  - For integration with insulin pumps
- OTC – designed to be used for people without diabetes, but could be considered for PWD who are not at risk for hypoglycemia
  - Lingo
  - Stelo

Professional CGM Systems

	FreeStyle Libre Pro	DexCom G6 Pro
Length of wear	14 days	10 days
Data view	Blinded only	Blinded or Unblinded
Site	Upper arm	Abdomen
Calibration	Factory	Factory
Components	Single use disposable sensor/ transmitter. Requires scan every 8 hrs	Single use disposable sensor/ transmitter
MARD	12.3%	9%
Software	LibreView	Clarity

CPT99250 Initiation and Download
CPT99251 Interpretation

What are the benefits of CGM?

Glucose Control

- Meta-analysis of 5 studies 382 patients with pooled reduction in A1C of 0.25%
- Rt CGM reduction of 1.6% from a mean baseline of 8.9% in telemedicine population
- Telehealth model 740 participants across 21 states

reductions of 0.2-0.8% in population A1C 7.0-7.9%

reductions of 2.3% in population A1C > 9.0%

Janapla RN et al Continuous Glucose Monitoring vs self-monitoring of blood glucose in T2DM. Cureus 2019;11:e 5634

Mujitha AR et al. Glycemic Outcomes in adults with T2DM participants in a continuous glucose monitor-driven virtual diabetes clinic J med Internet Res 2020;22: e 1778

Dixon RF et al A virtual type 2 diabetes clinic using CGM and endocrinology visits. J Diabetes Sci Technol. 2020;14:908-911

JAMA Network™

Mobile Study

QUESTION For adults with poorly controlled type 2 diabetes treated with basal insulin without prandial insulin in primary care practices, does continuous glucose monitoring (CGM) improve hemoglobin A_{1c} (HbA_{1c}) levels compared with blood glucose meter (BGM) monitoring?

CONCLUSION This randomized clinical trial found there was a significantly greater decrease in HbA_{1c} level over 8 months with CGM than with BGM monitoring.

POPULATION

88 Women
87 Men

Adults with type 2 diabetes treated with basal insulin without prandial insulin

Mean age: **57 years**

LOCATIONS

15
Primary care practices in the US

INTERVENTION

175 Patients randomized

116
Continuous glucose monitoring
CGM with BGM testing performed as needed

59
Blood glucose meter monitoring
BGM testing performed when fasting and postprandial 1 to 3 times daily

PRIMARY OUTCOME

HbA_{1c} level at 8 months adjusted for the baseline value

FINDINGS

Mean HbA_{1c} level at 8 months

Continuous glucose monitoring		Blood glucose meter monitoring	
HbA_{1c}		HbA_{1c}	
Baseline	8 Months	Baseline	8 Months
9.1% ▶	8.0%	9.0% ▶	8.4%

Risk-adjusted difference was significant,
−0.4% (95% CI, −0.8% to −0.1%)

TIR CGM: 62%, BGM – 43%

© AMA

Martens T, Beck RW, Bailey R, et al; MOBILE Study Group. Effect of continuous glucose monitoring on glycemic control in patients with type 2 diabetes treated with basal insulin: a randomized clinical trial. *JAMA*. Published online June 2, 2021. doi:10.1001/jama.2021.7444

Trials show improvement in A1c and Time in Range in T2D not on insulin

	Martens T et al	Aronson R et al	Miller E et al
Improvement in A1c	8.4% ➛ 7.3%	8.5% ➛ 7.6%	9.8% ➛ 8.3%
Study Design	RCT	RCT	Observational
Medications	No insulin, SFU	≥ 1 non-insulin	GLP-1 + any

Martens T et al. ADA Sci Sessions Oral Presentation June 2024, Aronson R Et al. Diabetes Obes Metab 2023;25:1024-1031, Miller E et al 2024;15:2027-2038

Benefits of CGM for people not on insulin

- Improvements in self-care behaviors (survey of people with diabetes)
  - 90% reported healthier lifestyle with use of CGM
  - 87% changed food choices based upon CGM
  - 47% were more likely to walk or exercise in response to high glucose
- Improvements in adherence when able to see evidence that medication is effective
- Ability to understand when intensification of medication is needed.

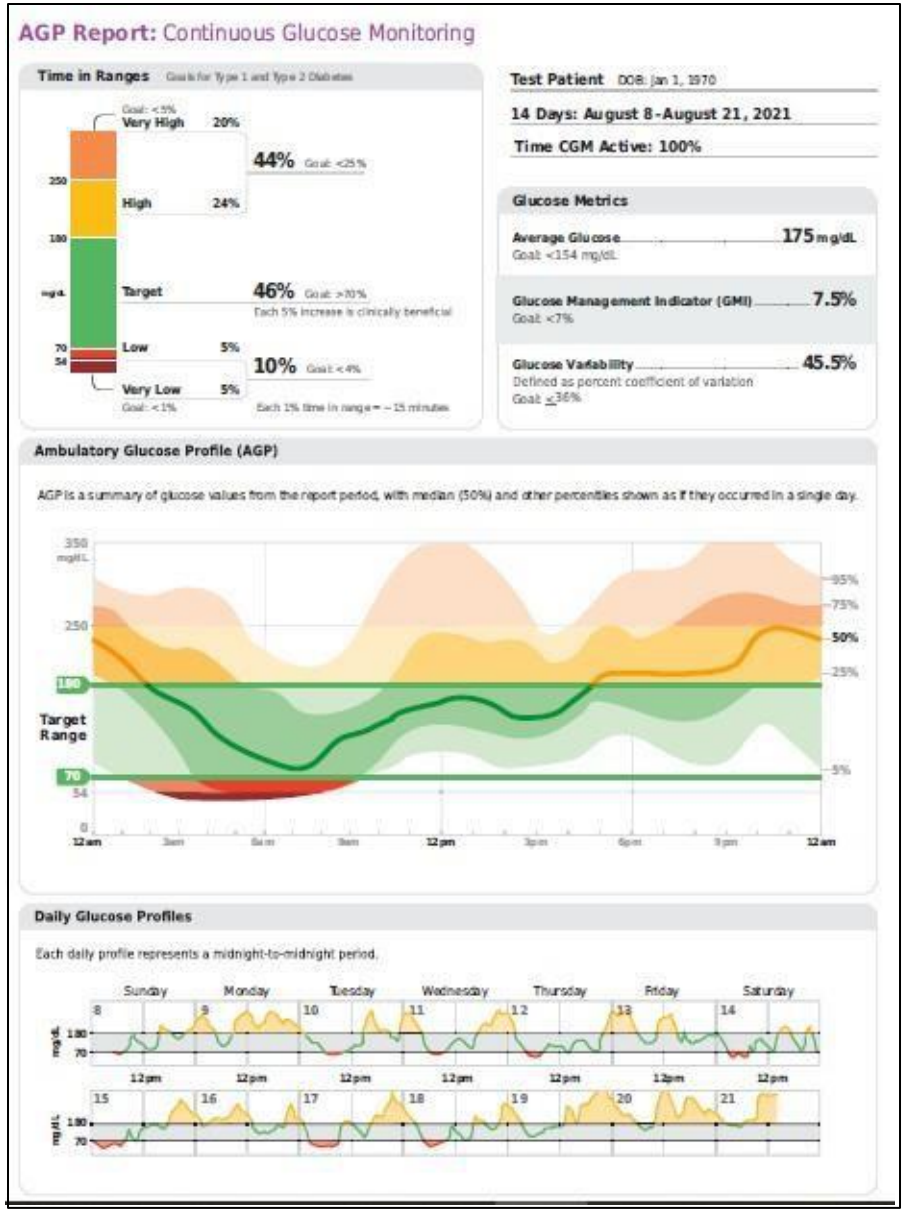
Lee SK et al Effect of Diabetes Education through pattern management on self-care and self efficacy in patients with T2DB: Int J Environ Res Public Health, 2019:16:3323
Taylor PJ et al Efficacy of Real-time Continuous Glucose Monitoring for type 2 diabetes management J Diabetes Investig 2018;9:713-725

Other benefits

- Patients with T2DM on a mix of insulin and non-insulin agents 49% experienced hypoglycemia during 5 weeks of professional CGM monitoring 21% glucose levels of 50 mg/dl or less
- Reduced ER visits
- Improved diabetes outcomes
- Reduced absenteeism from work
- Connectivity with insulin pumps and smart pens
- Specific data to focus on specific changes in meds/lifestyle
- Improved patient satisfaction

Gehlaut RR et al Hypoglycemia in T2DM – more common than you think: a CGM study. J Diabetes Sci Techol. 2015;9:999-1005,
ADA Standards of Care of Diabetes, 2024

Ambulatory Glucose Profile (AGP): Summary Report For All CGM Devices



Statistical Summary

Glucose Ranges	Targets [% of readings (Time/Day)]
Target Range 70-180 mg/dL	≥70% (16 hr 48 min)
Below 70 mg/dL	<4% (58 min)
Below 54 mg/dL	<1% (14 min)
Above 180 mg/dL	<25% (6 hr)
Above 250 mg/dL	<5% (1 h 12 min)

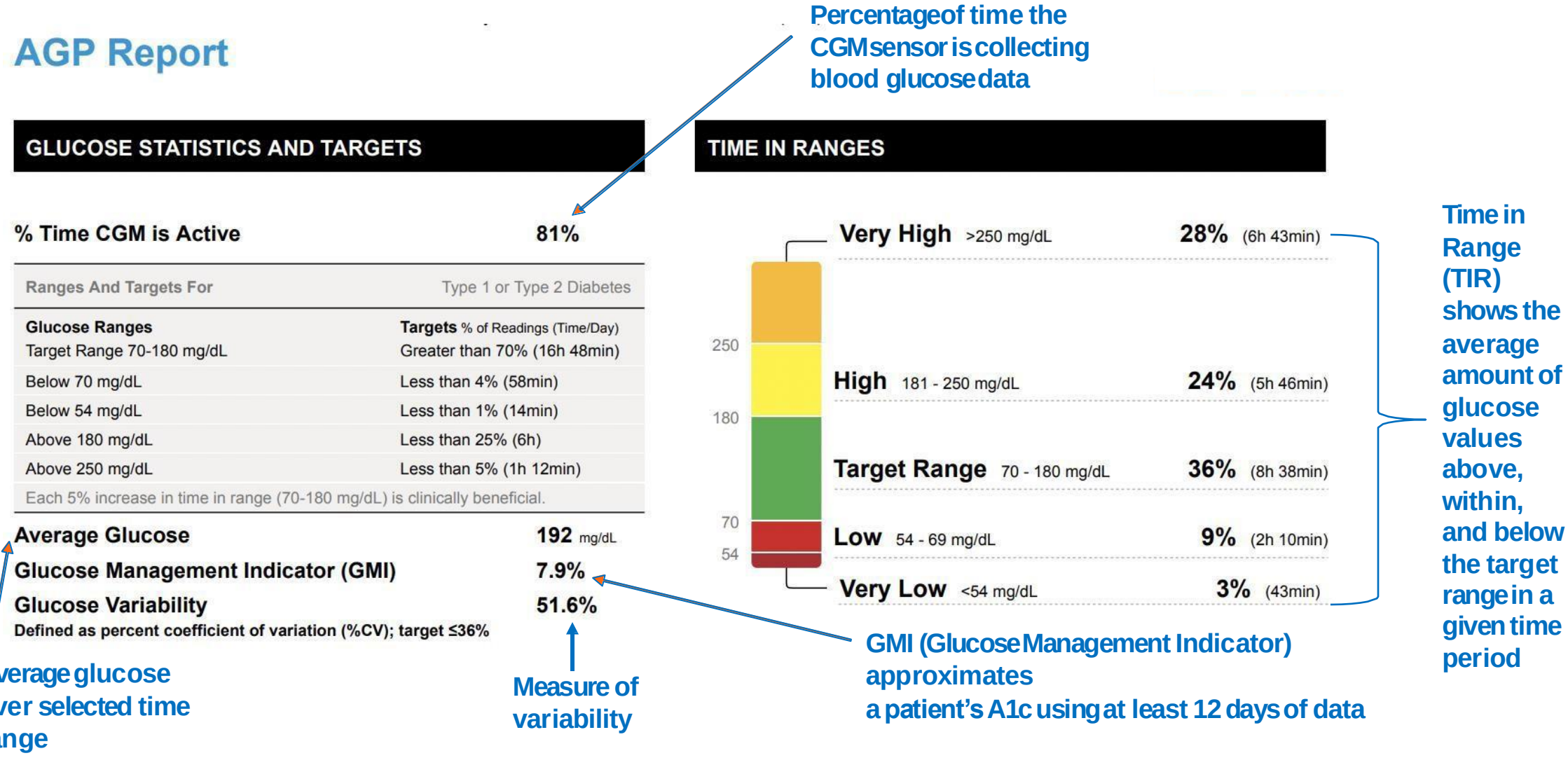
Glucose Variability
Defined as percent coefficient of variation (%CV) Target ≤36%

Ambulatory Glucose Profile

Median – Solid black line
25th – 75th Percentile (Interquartile range)
10th-90th Percentile
Above range: orange
Below range: red

Daily Glucose Profiles

Review: What does all the data mean?



Percentage of time the CGM sensor is collecting blood glucose data

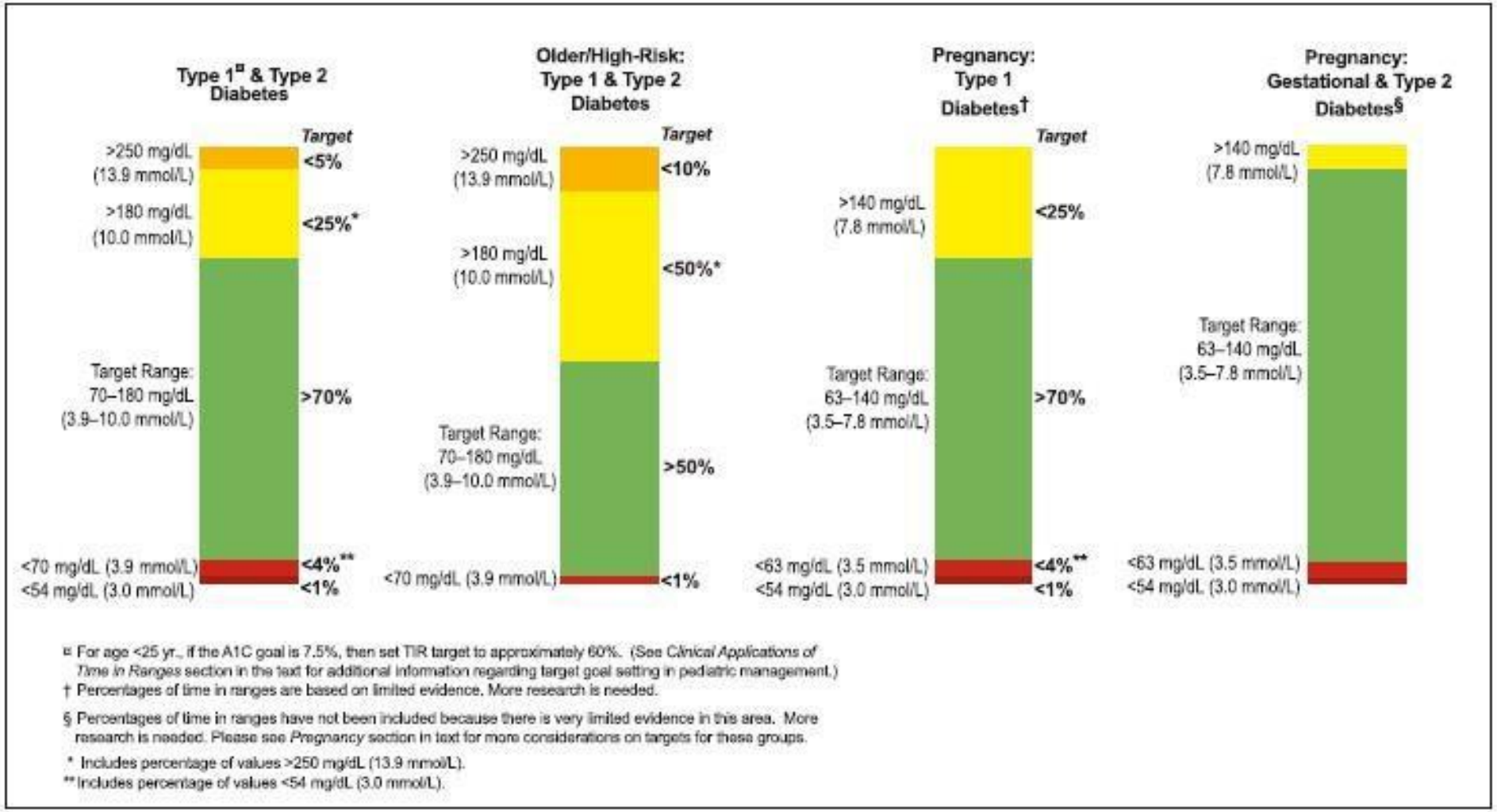
Average glucose over selected time range

Measure of variability

GMI (Glucose Management Indicator) approximates a patient's A1c using at least 12 days of data

Time in Range (TIR) shows the average amount of glucose values above, within, and below the target range in a given time period

Individualizing Goals for CGM Metrics



¤ For age <25 yr., if the A1C goal is 7.5%, then set TIR target to approximately 60%. (See *Clinical Applications of Time in Ranges* section in the text for additional information regarding target goal setting in pediatric management.)

† Percentages of time in ranges are based on limited evidence. More research is needed.

§ Percentages of time in ranges have not been included because there is very limited evidence in this area. More research is needed. Please see *Pregnancy* section in text for more considerations on targets for these groups.

* Includes percentage of values >250 mg/dL (13.9 mmol/L).

** Includes percentage of values <54 mg/dL (3.0 mmol/L).

There is a correlation between TIR and A1c

TIME IN RANGE (TIR%)	AVERAGE A1C
40%	8.1%
50%	7.7%
60%	7.3%
70%	6.9%
80%	6.5%

10% improvement in TIR% represents 2-1/2 hours per day, 0.4 – 0.6% improvement in A1c

CGM clinical evidence and real-world studies

Increased Time in Range (TIR)

Microvascular complications*[1]

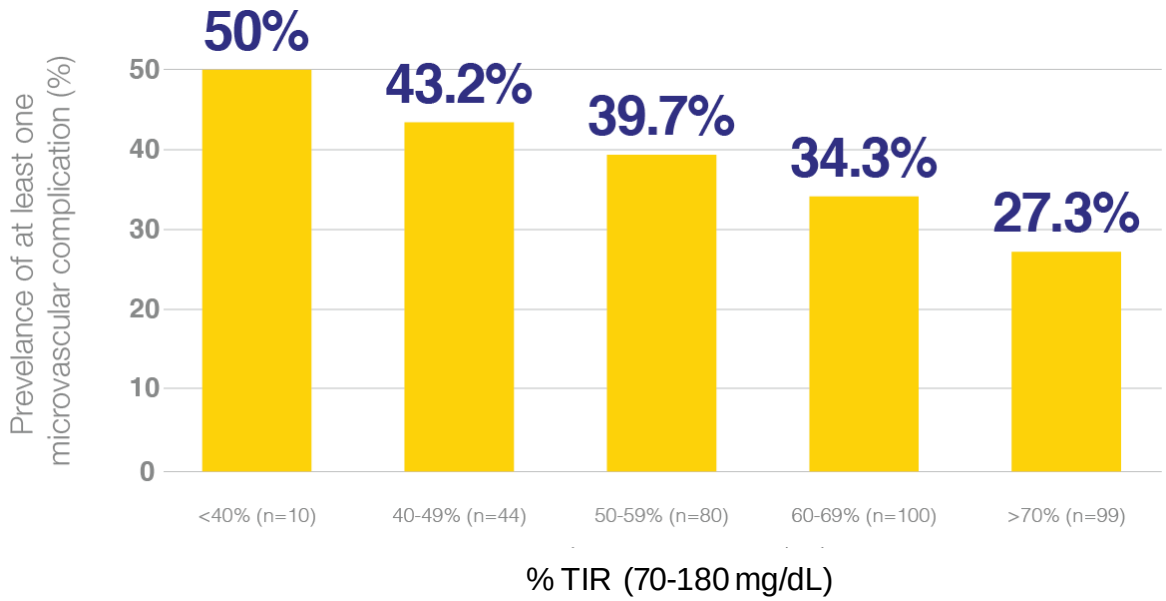
Patients who spend less TIR are more likely to experience complications such as retinopathy, nephropathy, and neuropathy.

Macrovascular complications†[2]

Patients who spend more TIR are more likely to experience a lower rate of first major adverse cardiac events (MACE).

50 % improvement in TIR is associated with a 50% reduction in Micro and Macrovascular risk

[1]



*Results from a study of 515 adults with T1D using real-time CGM. †Results from a study of 7637 patients with T2D with cardiovascular disease or at high risk.

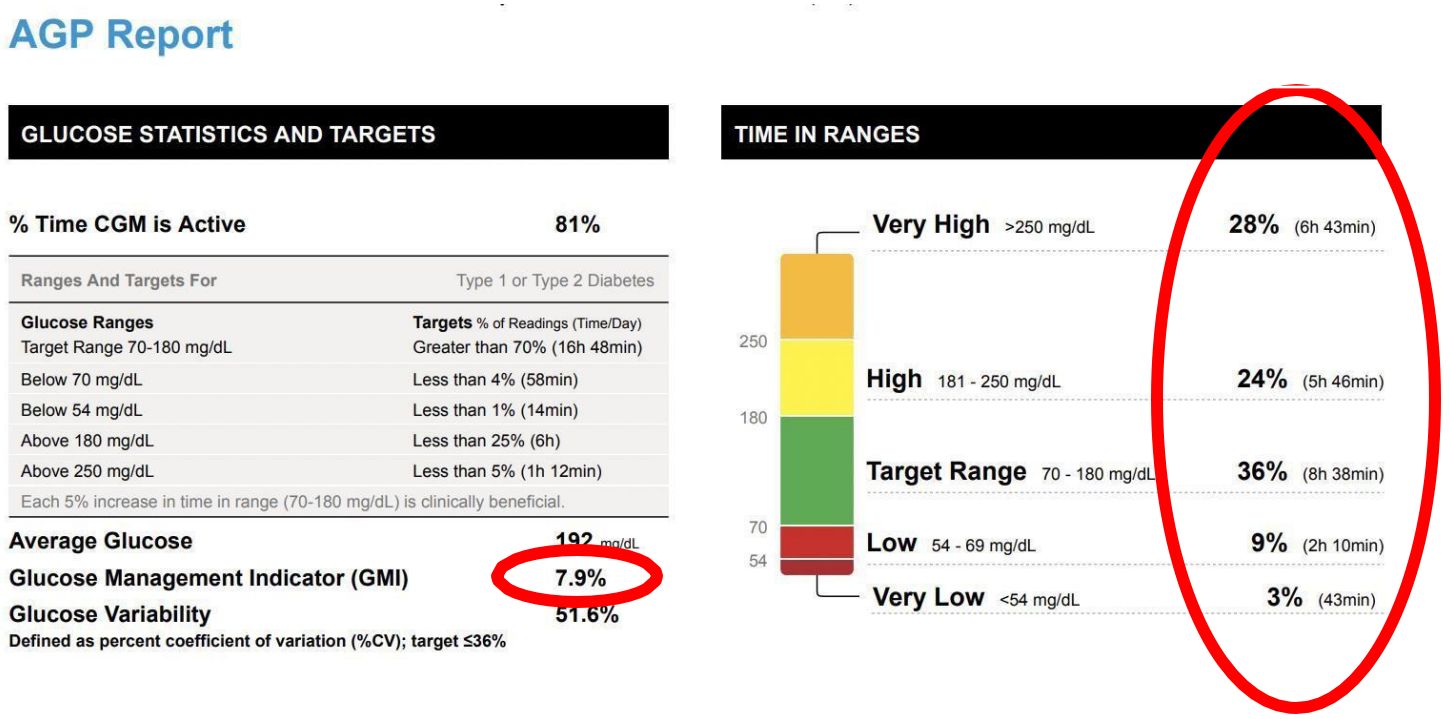
1. El Malahi, Anass, et al. "Chronic Complications Versus Glycaemic Variability, Time in Range and HbA1c in People with Type 1 Diabetes: Sub Study of the RESCUE trial." European Association for the Study of Diabetes 56th Congress, Vienna, Austria, September 22, 2020. DOI: https://doi.org/10.1530/endoabs.71.012. **2.** Berganstal Richard M, Elise Hachman-Nielsen, Kajsa Kvist, John B. Buse. "Derived Time-in-range is Associated with MACE in T2D: Data From the DEVOTE Trial." *Diabetes* 69 (suppl 1) (June 2020). DOI: https://doi.org/10.2337/db20-21-LB.

Meet BJ

- BJ is a 62-year-old female with a past medical history of type 2 diabetes for 7 years, hypertension, hyperlipidemia, coronary artery disease & chronic kidney disease
- Current A1c: 8.2%
- Outpatient diabetes regimen: Empagliflozin 10mg daily, metformin 1500 mg daily, insulin glargine 42 units daily in the morning, and 35 units nightly
- BG monitoring: CGM

A1c versus GMI versus TIR

- A1c: 8.2%
- GMI: 7.9%
- Target in range: 36%
  - Goal 70%
- Time above Range: 52%
  - Goal <25%
- Time below Range: 12%
  - Goal <5%



AGP Report

GLUCOSE STATISTICS AND TARGETS

% Time CGM is Active	**81%**

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	**192** mg/dL
Glucose Management Indicator (GMI)	**7.9%**
Glucose Variability	**51.6%**

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

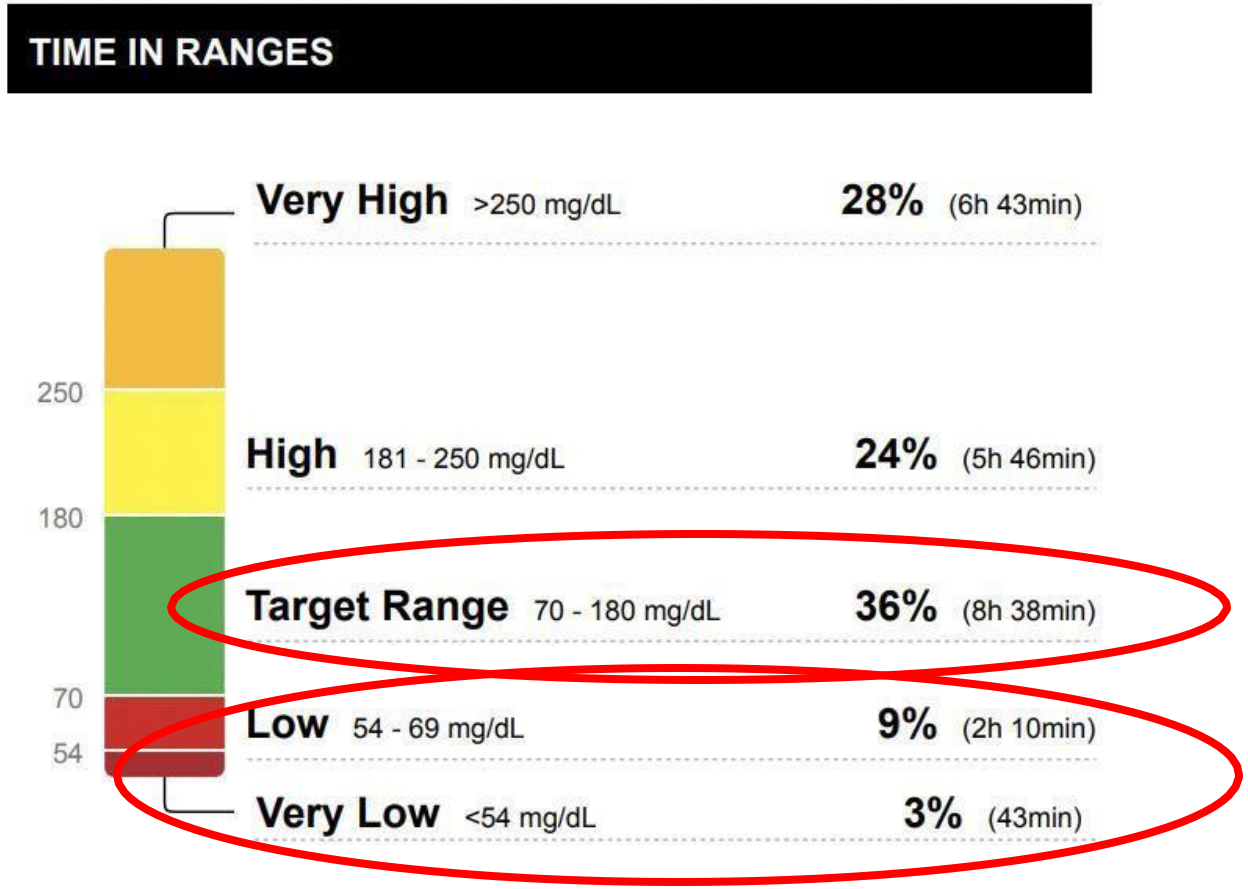
TIME IN RANGES

Very High	>250 mg/dL	**28%** (6h 43min)
High	181 - 250 mg/dL	**24%** (5h 46min)
Target Range	70 - 180 mg/dL	**36%** (8h 38min)
Low	54 - 69 mg/dL	**9%** (2h 10min)
Very Low	<54 mg/dL	**3%** (43min)

250
180
70
54

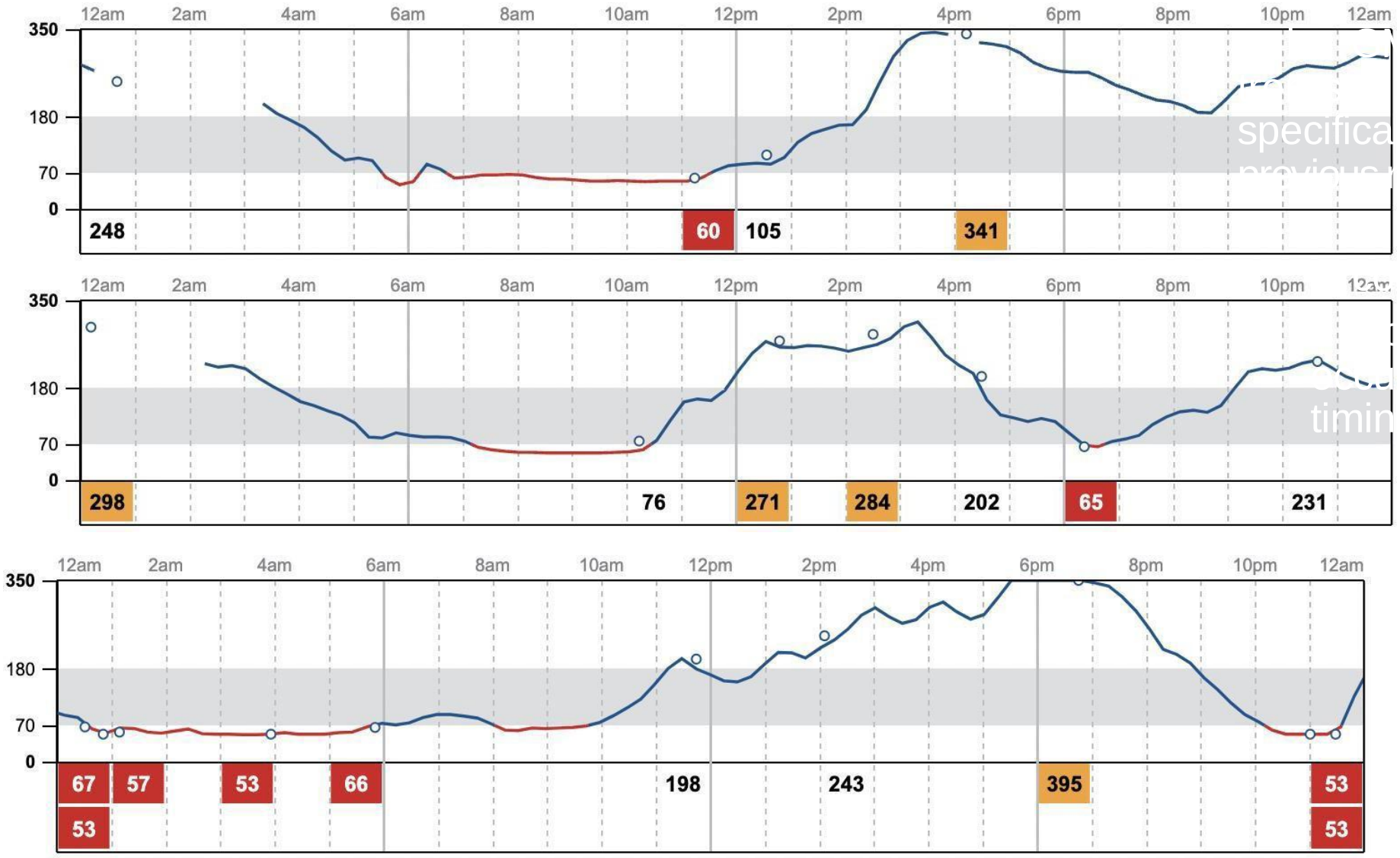
Where to Start?

"Two metrics, %TIR and %TBR, should be used as the starting point for the assessment of quality glycemic control and as the basis of therapy adjustment, with emphasis on reducing %TBR when the percentage of CGM values falling below 54 mg/dL or 70 mg/dL are close to or exceed targets."



Grunberger G, Sherr J, Allende M, Blevins T, Bode B, Handelsman Y, Hellman R, Lajara R, Roberts VL, Rodbard D, Stec C, Unger J. American Association of Clinical Endocrinology Clinical Practice Guideline: The Use of Advanced Technology in the Management of Persons With Diabetes Mellitus. Endocr Pract. 2021 Jun;27(6):505-537. doi: 10.1016/j.eprac.2021.04.008. PMID: 34116789.

Looking More Closely: Daily Log



What should be done to improve BJ's glycemic control

Current regimen: Empagliflozin 10mg daily, insulin glargine 42 units daily in the morning, and 35 units nightly

1) Increase Glargine to 46 units am and 38 units pm

2) Increase Empagliflozin to 25 mg

3) Advise her to eat keto diet

4) Lower basal insulin to 40 units am and 30 units pm + add GLP-1 RA

5) Other

Addressing Problematic Glycemic Patterns

Hypoglycemia (> 4 %)

- Review potential meal skips
- Stop or reduce SUs
- Reduce basal or pre-meal insulin dose
- Consider use of meds which do not increase likelihood of hypoglycemia
- Modify exercise timing related to insulin dosing
- Reduce or stop alcohol consumption
- Mismatch of prandial insulin dose and carbohydrate intake

Time in Range < 70 %

- Discuss med adherence
- Add basal insulin, GLP-1RA, SGLT2, or prandial insulin
- Discuss carb counting (identification) or meal size as related to prescribed insulin dosing

Unger J, Kushner P, Anderson JE. Practical guidance for using the FreeStyle Libre flash continuous glucose monitoring in primary care. Postgrad Med. 2020 May;132(4):305-313.

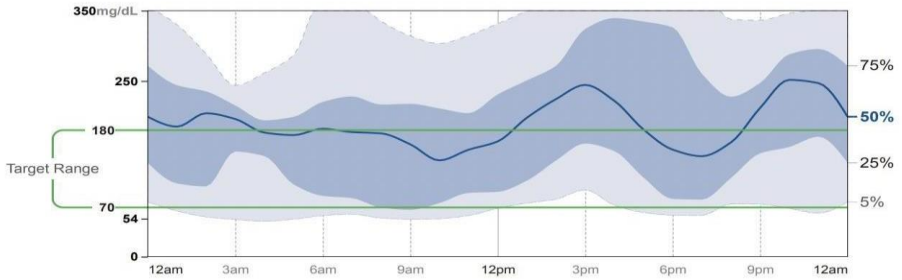
BJ's CGM At Baseline And After 3 Months

TIME IN RANGES

GMI=7.9
GV=51.%

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.



GLUCOSE STATISTICS AND TARGETS

January 19, 2022 - February 1, 2022	14 Days
% Time CGM is Active	88%

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	144 mg/dL
Glucose Management Indicator (GMI)	6.8%
Glucose Variability	35.5%

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

TIME IN RANGES

GMI=6.8 %
GV 35.5 %

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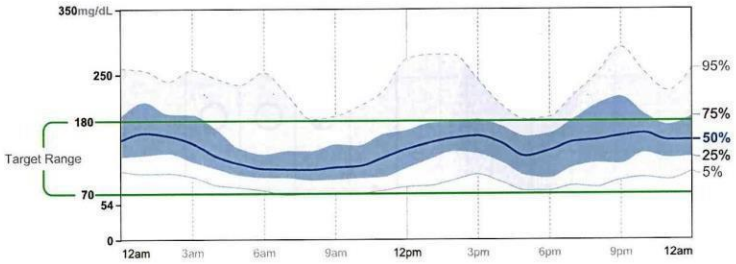
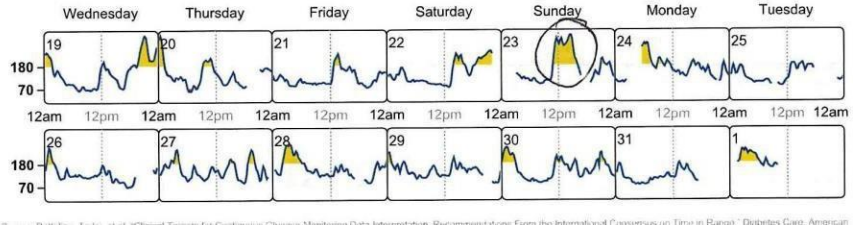


DAILY GLUCOSE PROFILES

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



Jerry

- 91 year old widowed veteran, lives alone.
- T2D for over 40 years, with good control: A1c – 6.5 – 7.5%
- Currently taking: Empagliflozin 10 mg, Pioglitazone 45 mg daily, Dulaglutide 1.5 mg, Glipizide 2.5 mg BID.
- Checks fingersticks QAM, generally 100 – 140.
- Denies symptoms of hypoglycemia
- He was preparing meals for several years before his wife passed and continues to do so. Walks 30 minutes daily in early afternoon. Admits to poor eating habits lately.
- Last A1c – 10.4% (checked his CBC and iron studies - normal)

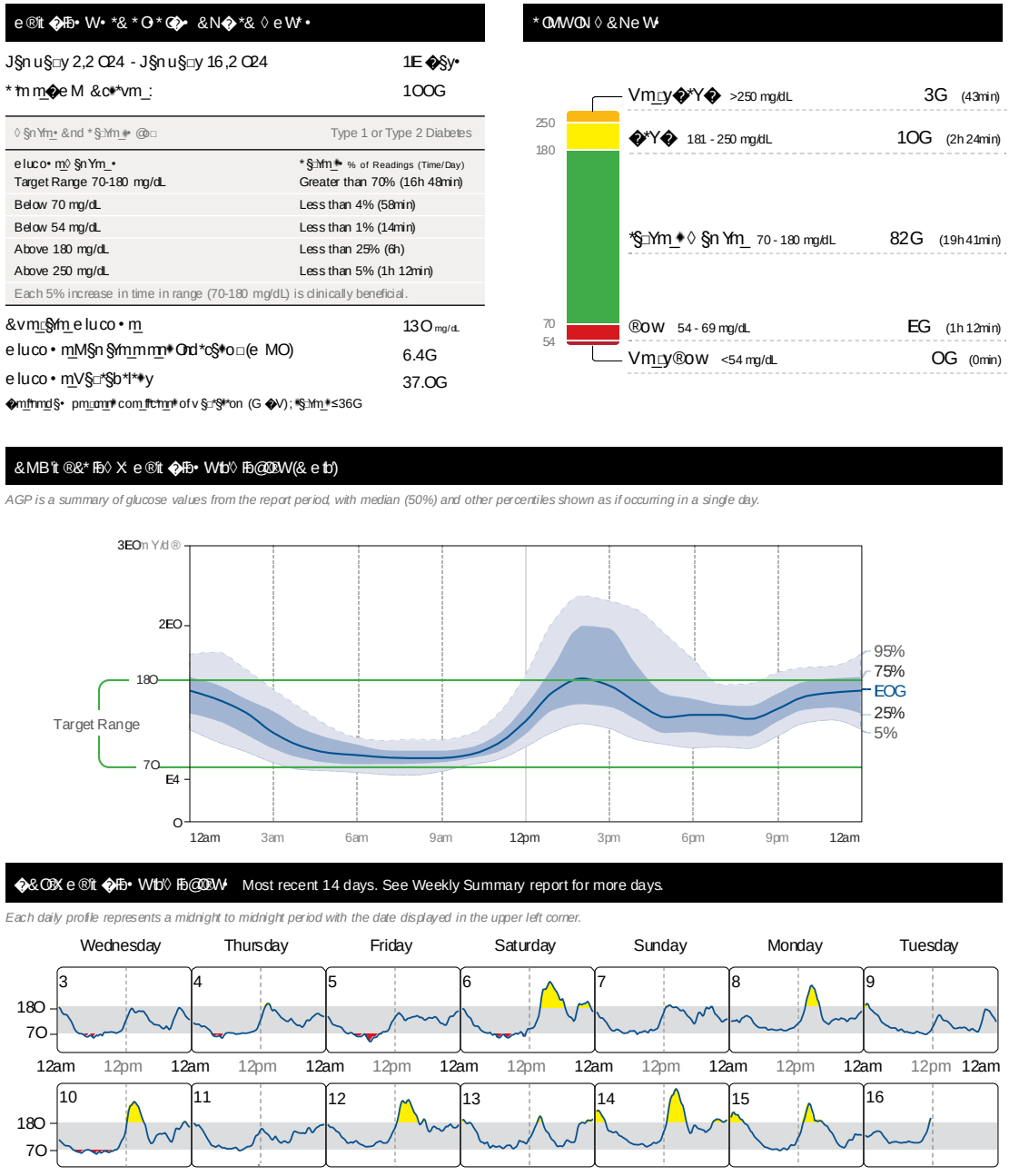
What would you do to improve Jerry's control

1) Add basal insulin 10 units at bedtime and titrate by am fasting glucose

2) Titrate dulaglutide up to 4.5 mg

3) Change dulaglutide to semaglutide

4) Perform professional CGM



Currently taking: Empagliflozin 10 mg, Pioglitazone 45 mg daily, Dulaglutide 1.5 mg, Glipizide 2.5 mg BID.

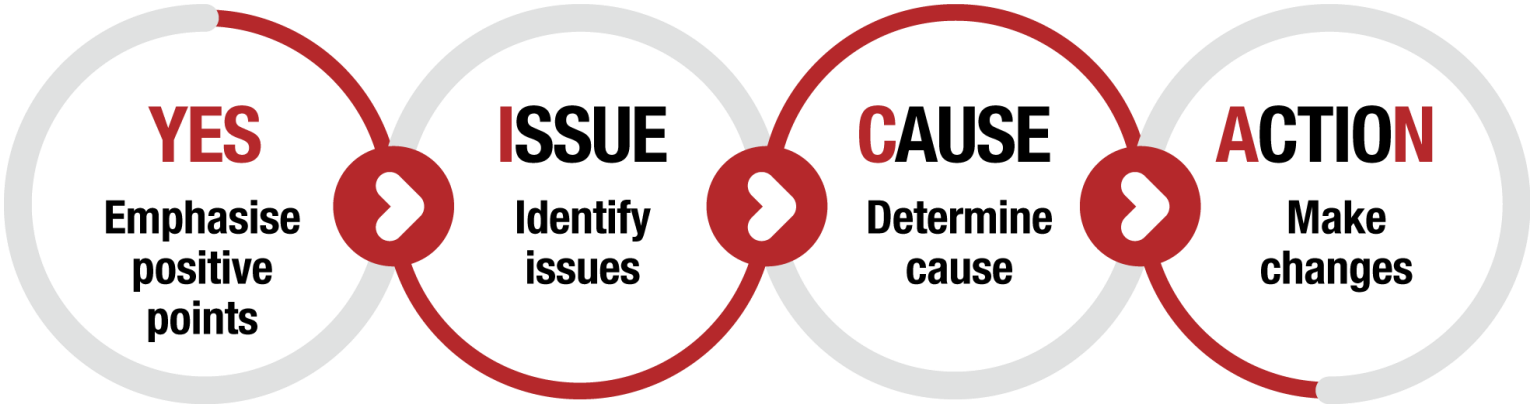
- GMI – 6.4%
- TBR – 5%!
- TIR – 82%
- GV – 37.0%

Now what are you going to recommend?

- 1) cut back carbohydrate intake
- 2) discontinue dulaglutide
- 3) raise dulaglutide dose
- 4) discontinue glipizide
- 5) other

Interpreting the AGP Report in the Clinic

1. Check for adequate data: has CGM been used at least 70% of the time during the report period?
2. Review TIR and TBR.
3. Review mean glucose, glucose management index (GMI) and glycemic variability (coefficient of variation [CV]).
4. Review the AGP graph to identify any patterns of hypoglycemia and hyperglycemia.
5. Discuss the key data from the AGP report and what they mean with the patient.
6. Identify one or two issues on which to focus, and make an action plan.



Mary

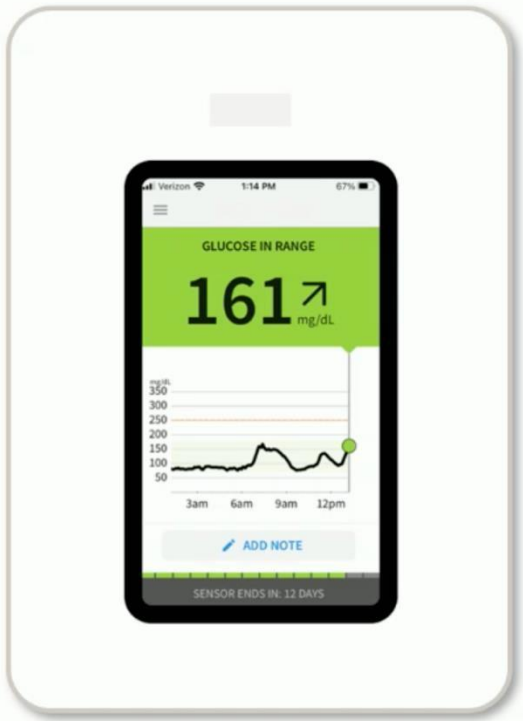
- 45 year old woman with new diagnosis diagnosis of prediabetes
- A1c – 5.9%
- History of hypertension, gestational diabetes
- Medications: Losartan 100 mg daily
- BMI – 32kg/m^2
- Admits to a sedentary diet and eats on the run most of the time

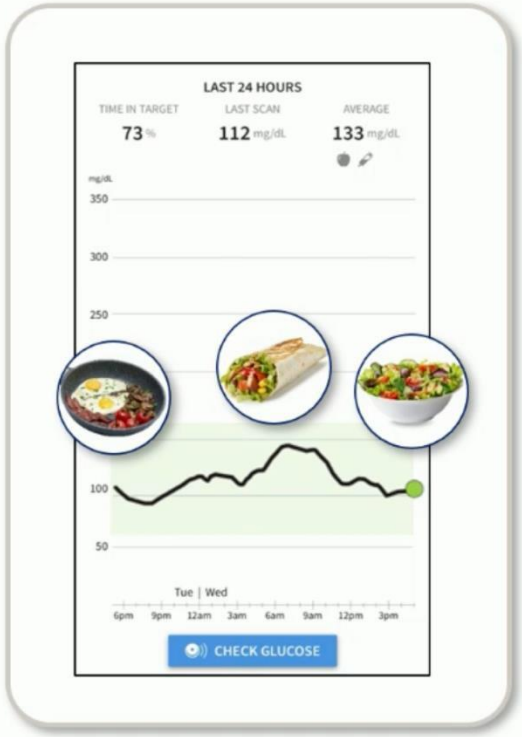
What would you recommend for Mary?

- 1) Start low carb diet
- 2) Appointment with an RD
- 3) Start metformin
- 4) Other

Mary

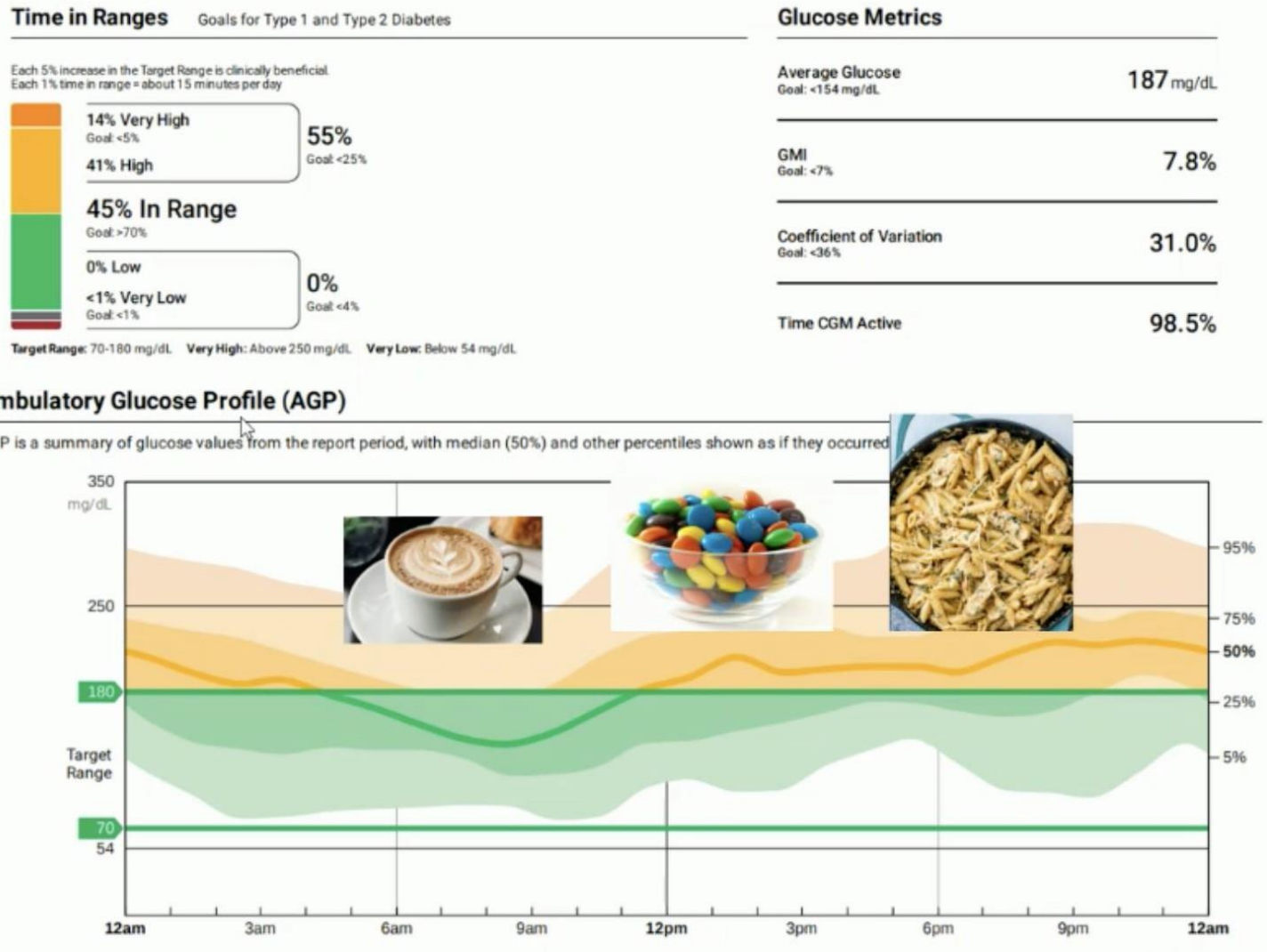
The potential effect of CGM use on change in lifestyle





Applying CGM Guided Nutrition in the Clinic

Encourage Experimentation with documentation and evaluation



Applying CGM Guided Nutrition in the Clinic

Time in Ranges Goals for Type 1 and Type 2 Diabetes

Each 5% increase in the Target Range is clinically beneficial.
Each 1% time in range = about 15 minutes per day

14% Very High	Goal: <5%	55% Goal: <25%
41% High		
45% In Range	Goal: >70%	
0% Low		0% Goal: <4%
<1% Very Low	Goal: <1%	

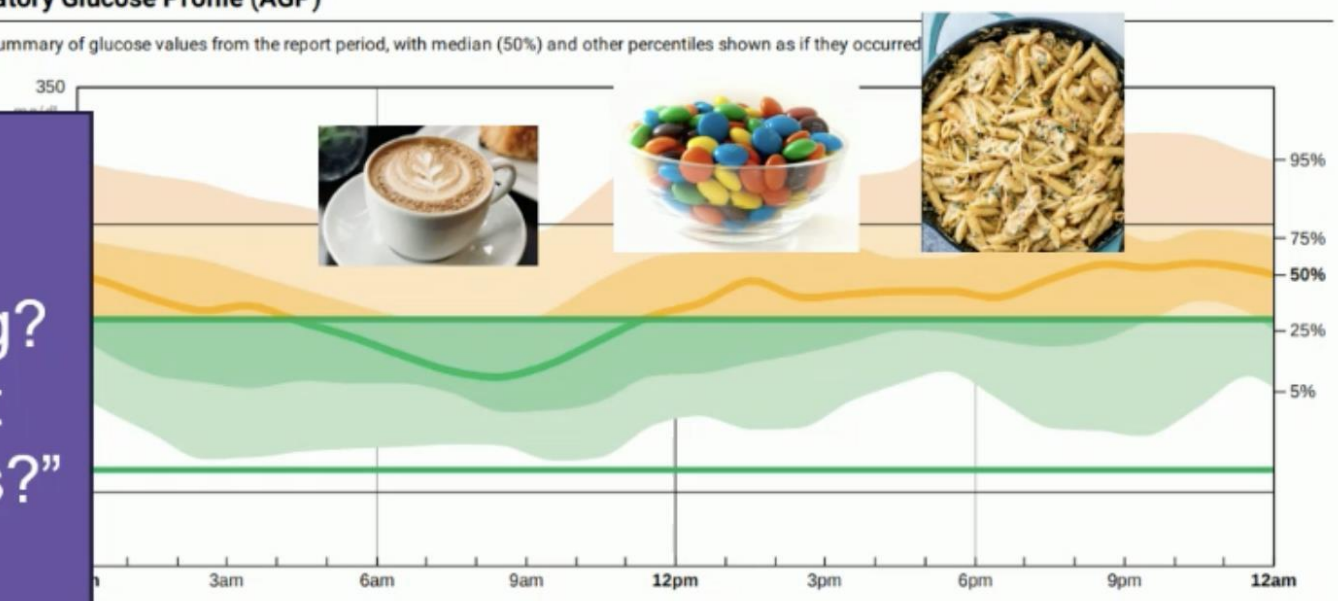
Target Range: 70-180 mg/dL **Very High:** Above 250 mg/dL **Very Low:** Below 54 mg/dL

Glucose Metrics

Average Glucose Goal: <154 mg/dL	187 mg/dL
GMI Goal: <7%	7.8%
Coefficient of Variation Goal: <36%	31.0%
Time CGM Active	98.5%

Ambulatory Glucose Profile (AGP)

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



"Would you be open to an unsweetened drink in the morning? What about exploring a different snack option to see what happens?"

Applying CGM Guided Nutrition in the Clinic

Time in Ranges

Goals for Type 1 and Type 2 Diabetes

Each 5% increase in the Target Range is clinically beneficial.
Each 1% time in range = about 15 minutes per day

0% Very High Goal: <5%	24% High	24% Goal: <25%
76% In Range Goal: >70%		
0% Low 0% Very Low Goal: <1%		0% Goal: <4%

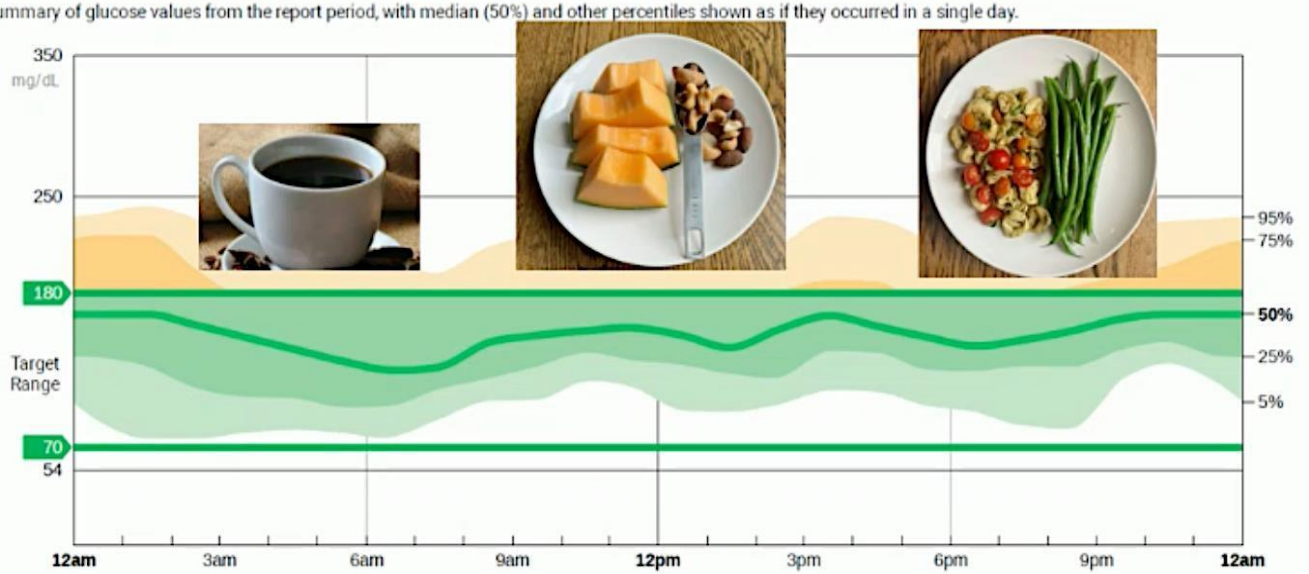
Target Range: 70-180 mg/dL **Very High:** Above 250 mg/dL **Very Low:** Below 54 mg/dL

Glucose Metrics

Average Glucose Goal: <154 mg/dL	153 mg/dL
GMI Goal: <7%	7.0%
Coefficient of Variation Goal: <36%	25.4%
Time CGM Active	93.0%

Ambulatory Glucose Profile (AGP)

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



Now, for some of the more practical issues:

Selecting patients
Starting patients on devices
How to get the data for review
Billing

Selecting patients for CGM

- All willing patients with T1D, coverage is nearly universal
- Recommended for patients with T2DM on insulin. If starting basal insulin, prescribe concurrently to help with titration
- For T2DM not on insulin can be helpful. Usually not covered by Medicare, unless recurrent or severe hypoglycemia. Can use Professional CGM, which is widely covered.
  - Helps patient identify areas for improvement in lifestyle and/or need for more intensive therapy. Can be used intermittently
- Washington Medicaid patients – coverage available for patients on MDI, with hypoglycemia.
- With Good Rx or SingleCare, can purchase without insurance for 60 – 100 dollars per sensor

Medicare Eligibility Requirements for Personal CGM

- Diagnosis of diabetes. No requirement for baseline SMBG testing
- Beneficiary (or beneficiary's caregiver) has sufficient training using the CGM prescribed.
- The beneficiary meets are at least one of the criteria below:
  - **Is insulin-treated**; **or**
  - Has a history of problematic hypoglycemia with documentation of at least one of the following:
    - Two or more level 2 hypoglycemic events (glucose < 54 mg/dl) that persist despite multiple modifications to the treatment or medication plan,
    - One level 3 hypoglycemic event (glucose < 54 mg/dl) characterized by altered mental and/or physical state requiring third-party assistance for treatment.
  - Seen for diabetes management in past 6 months.
  - For continuing eligibility, all of the above must continue to be met.

Create an account for your clinic (1 per site), but each MA will need access to uploader on a computer (takes an IT ticket)

- https://clarity.dexcom.com/professional/
- https://pro.libreview.io/articles/create-an-account/

Getting patients started on personal CGM

- Help patient select the best system for them, based upon individual characteristics and preferences
- Order system through EMR: Commercial and Medicaid: pharmacy benefit. Medicare - DME
- Ensure PWD understands the concept of lag time and potential inaccuracies in SMBG testing
- Encourage them to look at sensor reading before and after meals to help with dosing (if on prandial insulin) or to evaluate effects of timing of insulin, high fat meals, etc.and exercise on glucose readings
- Importantly, they should not rely on the time it takes the CGM to show recovery after treating hypoglycemia (may be delayed up to 30 minutes)

Train Your Patients and Staff

- If patients have a smart phone, encourage them to download the patient versions of Dexcom Clarity or Freestyle Libreview, while in the office.
  - You can invite them from your account.
  - Their data will be automatically uploaded to the cloud and accessible at the time of their visit (or for remote monitoring by you, RN or PharmD)
- If they do not have a smart phone, the patient can download software at home and upload their readers or anyone in the office can upload
  - In our office, the front office staff downloads our patient's technology, if the PWD is not connected, via smart phone, to the cloud
- You can access the data online or ask your staff to print or to save a pdf in the media.

My approach

- If patient has a smart phone, I ask them to download the appropriate app (Dexcom G7 + Dexcom clarity OR Freestyle Libre 3) and to register
- The MA can then put on the sensor and scan it to activate it. They can inform patient how to link their account to the clinic account
- I provide written instructions for how to look at their data in Visit Summary.
- Optimally, patient should be scheduled for follow up within a month to review. Can be virtual or in person, with PharmD, ACDES or provider.
- If patient reaches out due to concerns about their data, I set up a virtual visit to review data and make recommendations (bill for interpretation)

Tips for Success

- Help patients set alarms to avoid alarm fatigue (or turn them off entirely, at first)
- Teach patients their targets
- Help patient to understand how to evaluate in real time (thinking fast):
  - Effects of content of meal
  - Effects of exercise (up to 6 hours later)
  - How to correct high and low BG as they occur
- Encourage patients to evaluate their own AGP (thinking slow)
- Review effects of missed or late boluses and post-insulin dose correction

Adhesion issues

- If sensor falls off early
  - Check location to minimize pulling on sensor when removing clothing
  - If excessive hair, patient may need to shave skin
  - Advise patient to press on sensor for about 10 seconds and to use a fingernail to seal the edges of the sensor adhesive
  - Wait an hour before getting wet
  - Use preparation like Skin Tac when preparing site (available on Amazon)
  - Replacements are available through the manufacturers (not the suppliers
- If skin reaction to sensor
  - Recommend trial of steroid spray or barrier cream
  - Messer L et al: DIABETES TECHNOLOGY & THERAPEUTICS Volume 20, Supplement 2, 2018

Consider Professional CGM

- For patients without coverage for personal CGM
- For patients awaiting prior authorization for personal CGM
- For patients unsure if they would like to use a CGM system

- For useful tips for professional CGM, see:

https://medschool.cuanschutz.edu/docs/librariesprovider294/prepare-4-cgm/professional-cgm-resource-page-3-30-22.pdf?sfvrsn=9e8583ba_2

Billing Codes For CGM : Can be billed with or without face to face visit

CPT code	Descriptor	Approximate Medicare Allowable
95249	Patient-owned (non-professional) CGM sensor placement, hook-up, calibration, patient training, removal of sensor, and printout of recording - Requires minimum of 72 hours of data collection - Can only be billed once for the duration the patient owns the device	$55.74 - $62.21
95250	Professional CGM sensor placement, hook-up, calibration, patient training, removal of sensor, and printout of recording - Requires minimum of 72 hours of data collection - Can be billed once per month	$148.46 - $163.23
95251	CGM download and interpretation - Patient does not have to be physically in the office - Can be billed once a month - Requires minimum of 72 hours of data for review	$35.60 - $38.09
99091	Download and interpretation of insulin pump data - Can be billed once a month - CPT codes 95249, 95250, and 95251 cannot be billed in addition to this code	$56.79 - $60.66

https://www.cms.gov/medicare/physician-fee-schedule/search

Billing codes for CGM

- 95251 – interpretation of CGM (can be billed during or between visits)
  - Covered by medicare monthly
  - Commercial coverage often has a separate copay
  - Requires a note, I use dot phrase: .cwcgm

    CGM Report
    Dates reviewed:
    Type of sensor:
    Statistics : see downloaded data
    Observations:
    Recommendations:

Summary

- CGM is an important advance in management of patients with diabetes. for helping patients improve glycemic control
  - Evidence demonstrates reduction in hypoglycemic episodes and improvement in A1C in children and adults with T1D
  - Evidence supports use of CGM for T2D in patients on multiple daily insulin injections and recently, in those on basal insulin
  - CGM provides insight for patient-specific management decisions about treatment and behavioral changes
  - CGM expands the ability to use telemedicine and for patients to be monitored remotely
  - CGM is increasingly being used in hospitalized patients

Additional Resources for training on CGM

https://www.diabeteseducator.org/danatech/glucose-monitoring/continuous-glucose-monitors-(cgm)/cgms-in-professional-practice/interpreting-cgm-patient-data

http://www.agpreport.org/agp/sites/default/files/CGM_Clinical_Guide_AGP.pdf