Diabetes Technologies Workshop:
Integrating Guidance, Gadgets & Gizmos

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Disclosures

- **I have no relevant relationships with ineligible companies to disclose within the past 24 months.**

Moonlighting as pancreas 24/7/365 for the past 33 years

Patient Perspective ⟷ *Provider Perspective*

Pre-Session Questions

1. When evaluating a patient with diabetes, correcting hyperglycemia should take priority over eliminating hypoglycemia.

   A. True
   B. False

Pre-Session Questions

2. A CGM can be considered in some capacity for which of the following persons with diabetes?

   A. Adolescent with T1D
   B. Adult male with T2D taking oral meds, considering insulin
   C. Pregnant female with T1D
   D. All of the above

Pre-Session Questions

3. 65 y.o. with T2DM presents for routine follow-up. Patient is on basal & bolus insulin. Reports blood sugars have been running 250-300 mg/dL for the last few months. Did not bring in a glucose log or meter but denies hypoglycemia. Today's A1c is 6.5%.

   What is the next best step for management of this patient's diabetes?

   A. Order an intermittently scanned CGM to collect more BG data for next visit
   B. Increase bolus insulin & decrease basal insulin to prevent hypoglycemia
   C. Advise short-term use of pro-CGM & start process for obtaining personal CGM
   D. Continue current regimen as A1c shows good diabetes control

Pre-Session Questions

4. In order to get Medicare coverage for a Continuous Glucose Monitor that is FDA approved for making treatment decisions without fingerstick verification, a person must meet <u>all the following requirements except</u>:

   A. Be on an insulin pump or receiving at least 3 doses of insulin per day
   B. Be monitoring their blood glucose at least 4 times daily
   C. Require frequent insulin dose adjustments based on CGM test results
   D. Be seen by a provider for diabetes within 6 months of CGM Rx & must continue to be seen at least every 6 months to continue coverage

Learning Objectives

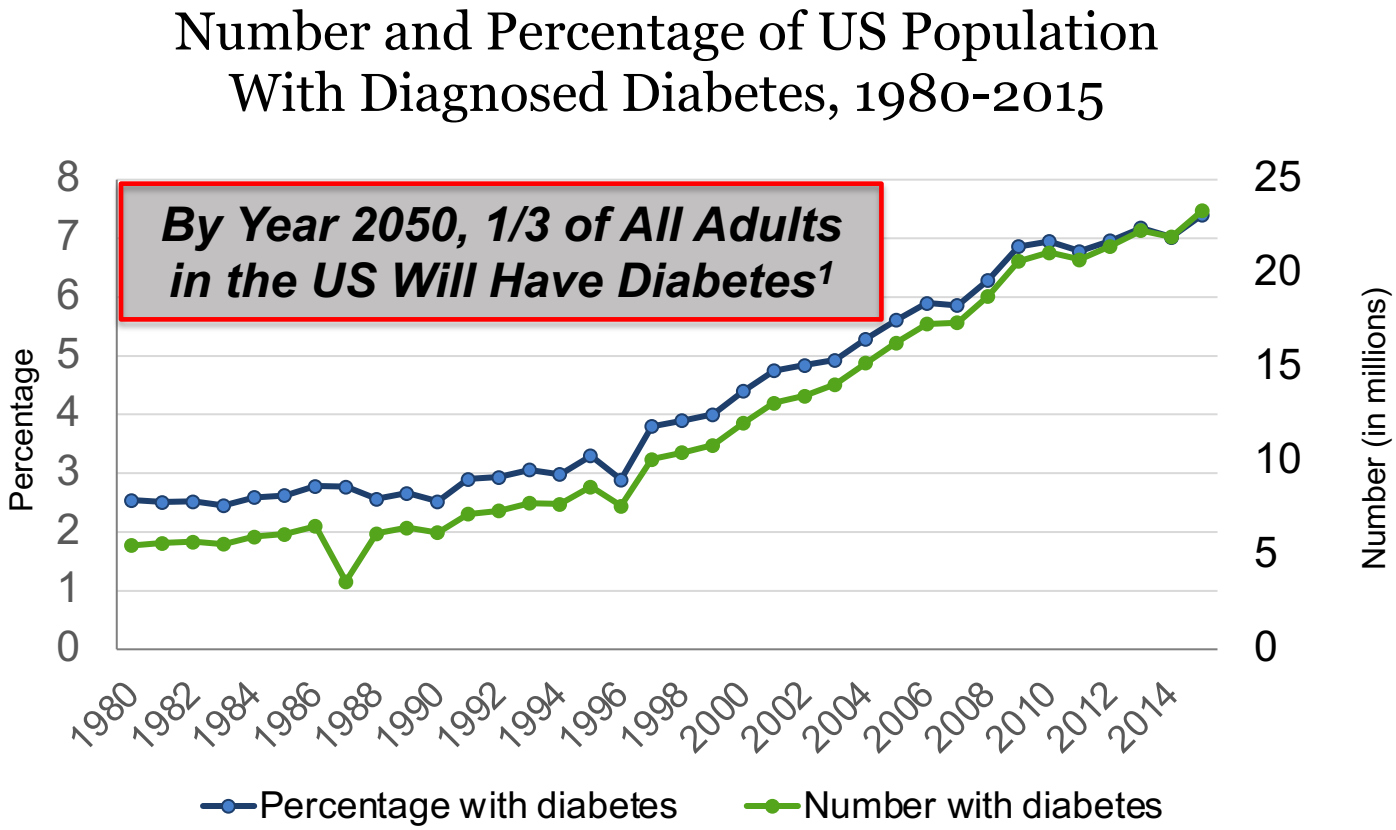
At the end of the presentation, the participant will be able to:

- ***Compare & contrast spectrum of ambulatory glucose data collection options***
- ***Explore practical tips for integration & application of CGMs & related devices into your practice***
- ***Discuss common access to care hurdles & strategies to improve access to glucose monitoring devices***
- ***Develop efficient processes for accessing, downloading & reviewing data in the primary care clinic***
- ***Analyze & interpret ambulatory glucose profile (AGP) data from CGMs & BG meters & formulate evidence-based treatment plans***

Workshop Plan – 120 min

- **#1 – Setting the Stage (5 min)**
- **#2 – Scope of Problem & Spectrum of Glucose Devices - Slides 9-32 (10 min)**
- **#3 – Apply CGMs (20 min)**
  - **Medtronic Guardian 3 CGM**
  - **Dexcom G6 CGM demo review & application**
- **#4 – Tech Integration into Patient-Centered Care - Slides 33-49 (8 min)**
- **#5 – Glucometer Review & Utilization (15 min)**
  - **Checking serum BG**
  - **Review meter data – "3 Minute Drill"**
- **#6 – Downloading & Reviewing BGM & CGM Data - Slides 50-68 (10 min)**
  - **Processes & Challenges**
  - **CGM Report Orientation**
- **#7 – Analyze & Interpret Cases 1-9: Group work - (20-25 min)**
- **#8 – Case Review & Discussion - Slides 69-103 (15 min)**
- **#9 – Clinic Tips - Slides 104-109 (5 min)**
- **#10 – Questions, Plan for CGM return & Clean-up (5 min)**

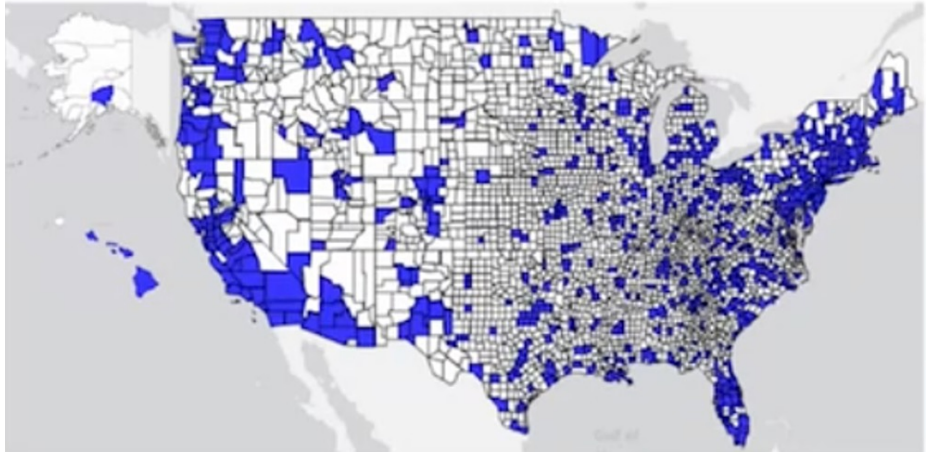
Scope of the Diabetes Epidemic



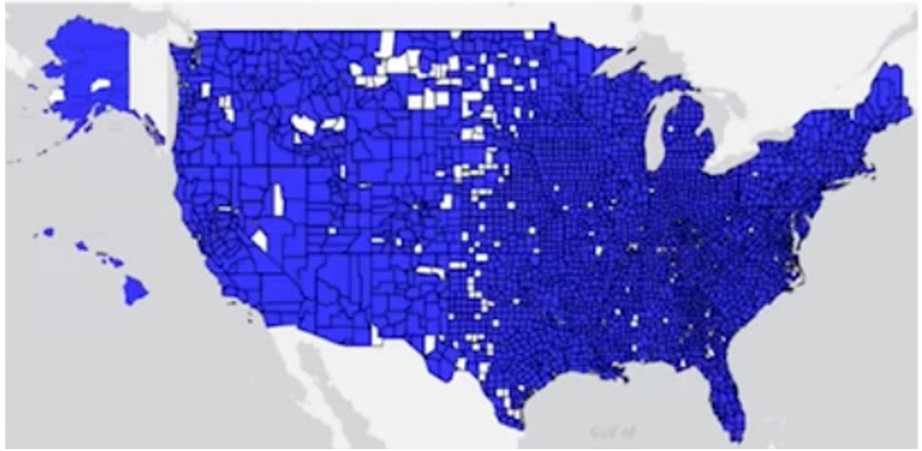
[1]CDC's Division of Diabetes Translation. United States Diabetes Surveillance System available at http://www.cdc.gov/diabetes/data

Distribution of Endocrinologists/Diabetologists & PCPs in US[1]

US Counties with ≥ 1
Pediatric or Adult Endocrinologist/Diabetologist



US Counties with ≥ 1
Primary Care Provider



Total PCPs in the US[2]:

PAs: 20%

NPs: 30%

MD/DOs: 50%

[1]Oser SM, Oser TK. Diabetes Technologies: We Are All in This Together. Clin Diabetes. 2020 Apr;38(2):188-189. doi: 10.2337/cd19-0046. PMID: 32327892; PMCID: PMC7164996.
[2]Petterson S, McNellis R, Klink K, Meyers D, Bazemore A. The State of Primary Care in the United States:

Brief History of Glucose Monitoring for Diabetes

- Urine dipsticks – Clinitest by Ames (1945)
  - Glucose-based color changes compared with a color chart
- Glucometers & Capillary blood glucose – Dextrostix by Ames (1965)
  - Designed for use in health providers' offices
- Introduction of HbA1c & emergence of BG meters – (1970-80's)
  - UK Study prompted concept of SMBG by patients
- Ames Glucometer I becomes available to patients in US – (1981)
  - Smaller meters in emerged 1991 – 2000
- Continuous Glucose Monitoring systems – FDA approved (1999)

Clarke SF, Foster JR. A history of blood glucose meters and their role in self-monitoring of diabetes mellitus. Br J Biomed Sci 2012;69:83–93

New Standards of Care

ADA. Glycemic Targets. *Diabetes Care.* 2022;45(Suppl.1):S83-S96

A1c% & Average BG Comparisons

HbA1c & Estimated Average BG

5% – 90 mg/dL

6% - 120 mg/dL

7% - 150 mg/dL

8% - 180 mg/dL

9% - 210 mg/dL

10% - 240 mg/dL

11% - 270 mg/dL

12% - 300 mg/dL

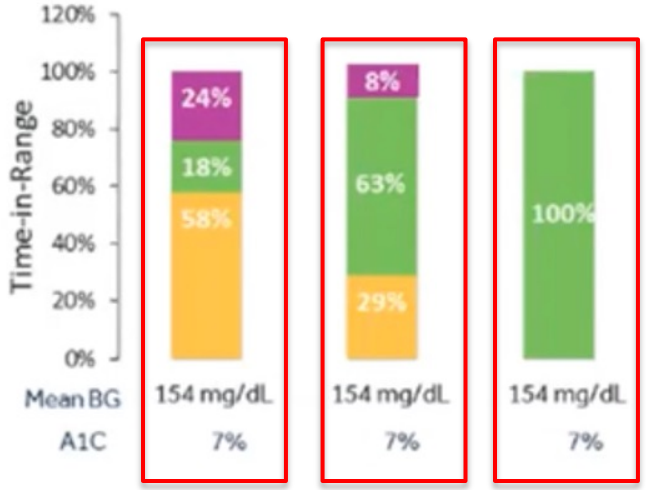
13% - 330 mg/dL

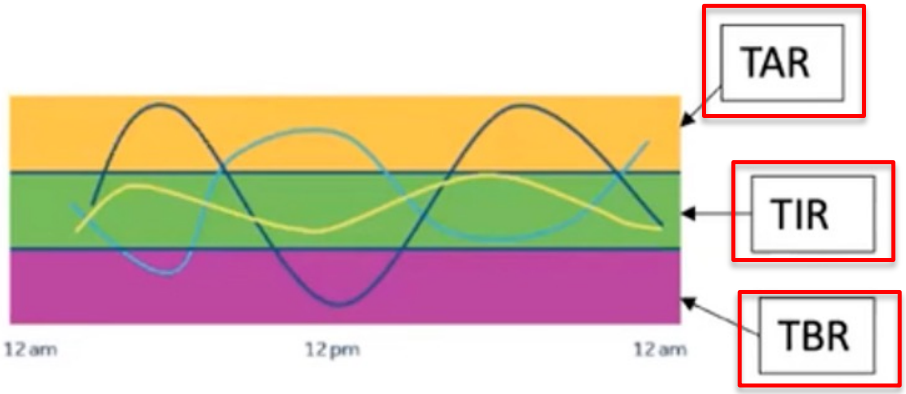
14% - 360 mg/dL

Glycemic Targets: *Standards of Medical Care in Diabetes - 2022. Diabetes Care* 2022;45(Suppl. 1):S83-S96

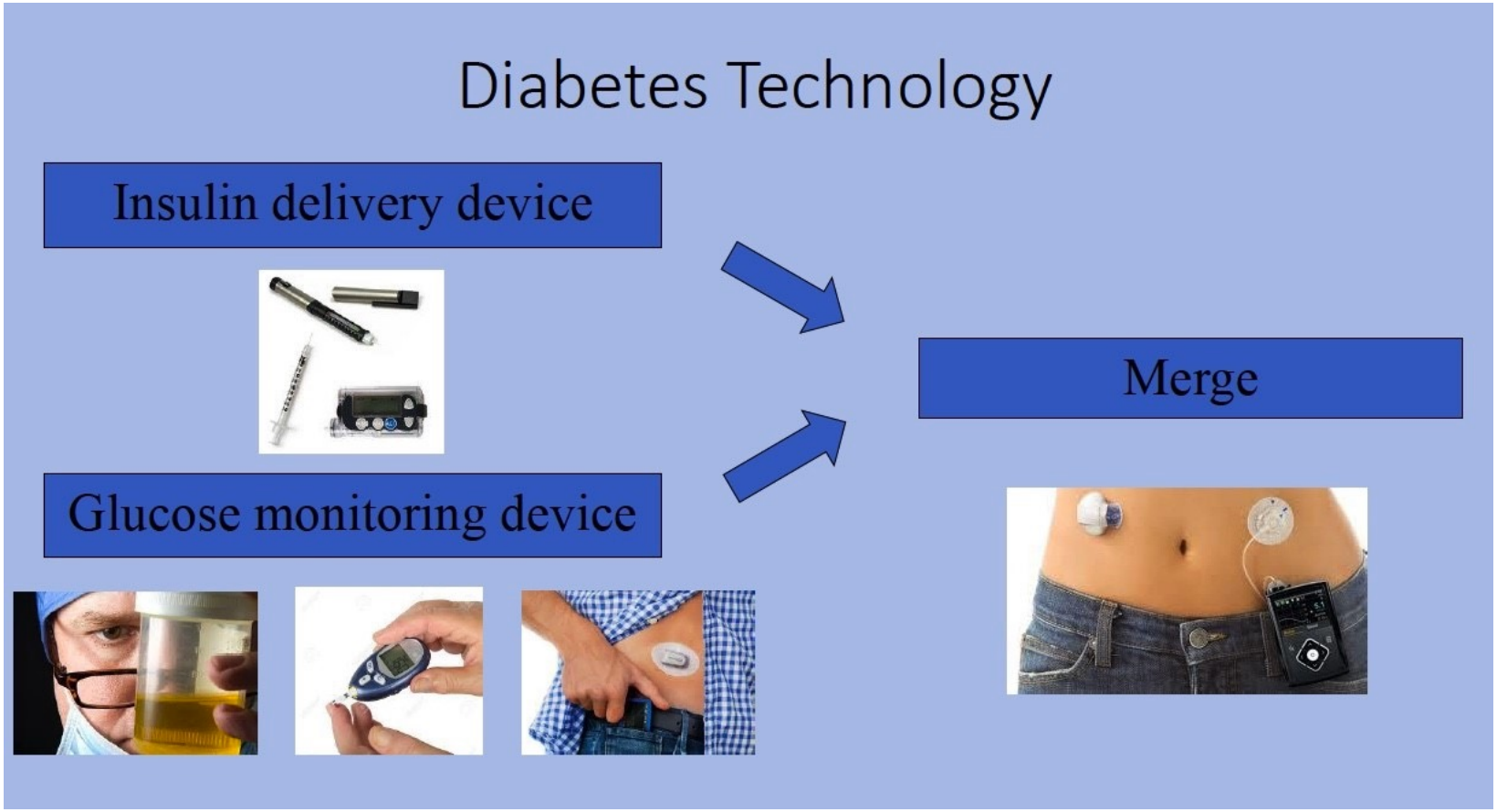
Limitations of Hemoglobin A1c

- Unable to reflect acute glycemic excursions
- A1c may be inaccurate in a range of physiologic and pathologic conditions
- Does not provide time-specific blood glucose data





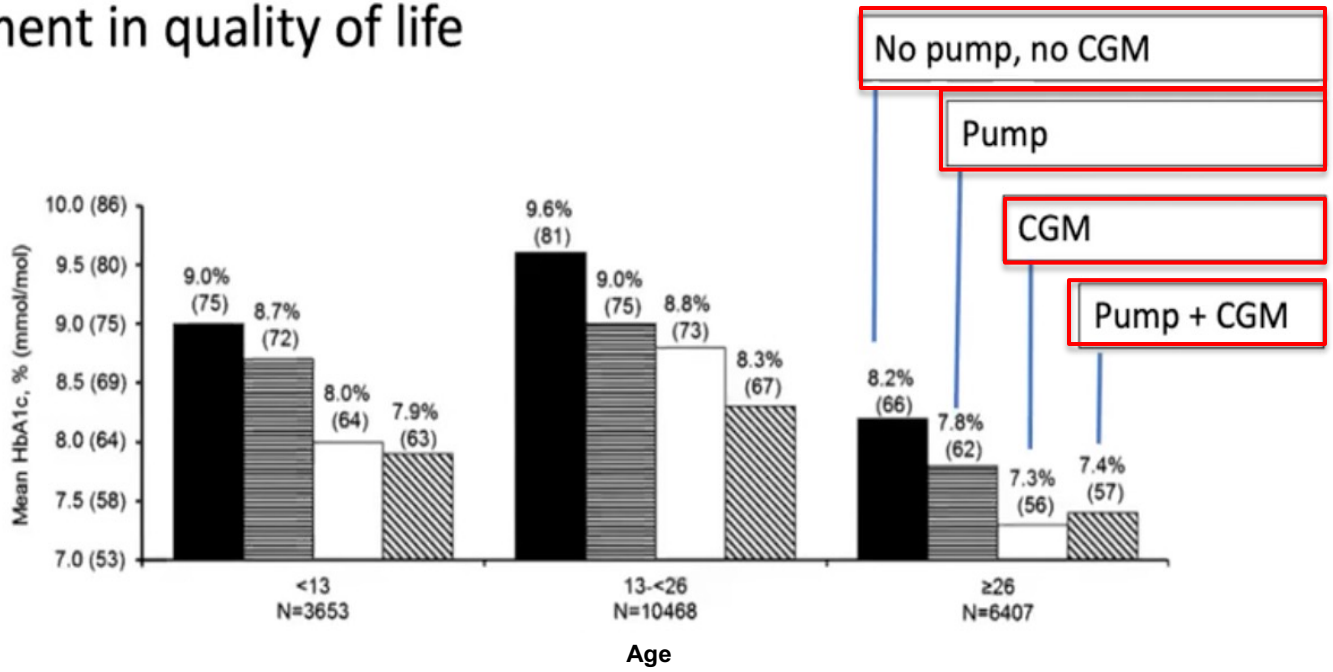
Advancing Diabetes Technology



Dovc K, Battelino T. Evolution of Diabetes Technology. *Endocrinol Metab Clin North Am*. 2020;49(1):1-18. doi:10.1016/j.ecl.2019.10.009

Why Use Technology?

- Improved glycemic control
- Reduction in hypoglycemia
- More information on daily fluctuations
- Potential improvement in quality of life



Foster et al. Diabetes Tech. Ther. 2019, DOI: 10.1089/dia.2018.0384

History of Continuous Glucose Monitoring (CGM)

- 2004 Medtronic Guardian REAL-Time CGM system
  - Required BG confirmation
- 2006 Medtronic integrated pump & sensor / Dexcom REAL-time CGM
  - Required BG confirmation
- 2008 Abbott FreeStyle Navigator
  - Required BG confirmation
- 2017 FreeStyle Libre Pro
  - First CGM that required no fingerstick testing during wear
  - Swipe or "flash" to obtain a glucose reading
  - Able to wear 14 days but no alarms for low/high BG levels
- 2016 Medtronic Minimed hybrid closed loop pump & Guardian 3 CGM
- 2018 Tandem t:slim pump & Dexcom CGM

Hirsch IB. History of Glucose Monitoring in Role of Continuous Glucose Monitoring in Diabetes Treatment. American Diabetes Association. 2018. 1-18.

Glycemic Targets for Patients with Diabetes[1,2,3]

Patient Characteristics	Reasonable HbA_{1c} Goal, %	Recommended Blood Glucose % for TIR or TBR
Nonpregnant adults aged <65 years with type 1 or 2 diabetes	<7.0	>70% of TIR 70-180 mg/dL <4% of TBR ≤69 mg/dL
Healthy adults aged ≥65 years with diabetes and few coexisting chronic illnesses	7.0-7.5	Fasting preprandial goal: 80-130 mg/dL Peak postprandial: <180 mg/dL
Adults aged ≥65 years with diabetes and multiple coexisting chronic illnesses	<8.0	>50% of TIR 70-180 mg/dL <1% of TBR ≤69 mg/dL

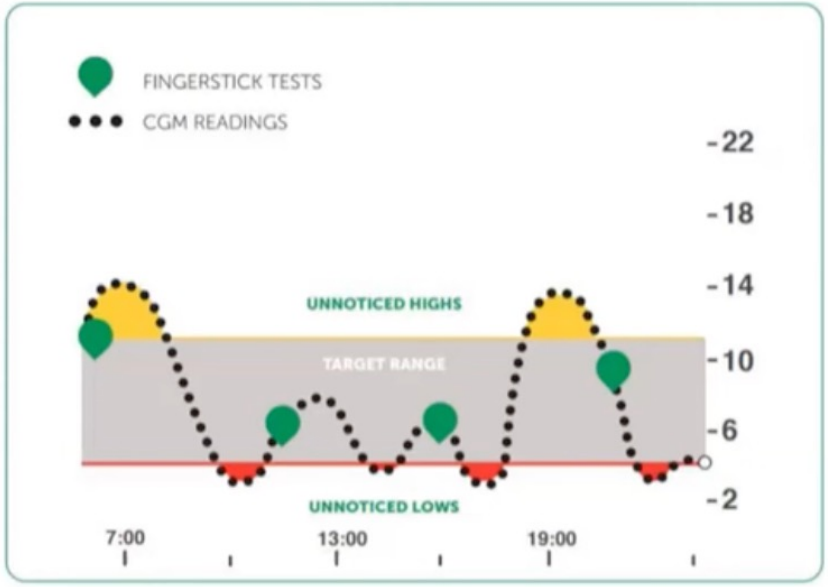
TBR, time below range; **TIR**, time in range

[1]ADA.Glycemic Targets. *Diabetes Care.* 2022;45(Suppl.1):S83-S96.
[2]ADA.Older Adults. *Diabetes Care.* 2022;45(Suppl.1):S195-S207.
[3]Battelino T, Danne T, Bergenstal RM, et al. Clinical targets for continuous glucose monitoring data interpretation: recommendations from the International Consensus on Time in Range. Diabetes Care. 2019;42(8):1593-1603.

Continuous Glucose Monitoring (CGM)

- Subcutaneous glucose sensor→ transmitter→ display
- Measures glucose levels every 5 minutes
- PROFESSIONAL DEVICES
  - Owned by clinic
  - Retrospective or Real-Time

- PERSONAL DEVICES:
  - Intermittently scanned or real-time



Benefits of CGM

Provides hundreds of sensor glucose measurements daily

Permits real-time biofeedback about BG patterns to patients

Empowers patients to become more engaged & proficient in self-management

Types of CGMs

Type of CGM	Description
rtCGM	Measures & stores BG levels continuously w/o prompting; patient-owned
isCGM with & w/o alerts	Measures BG levels continuously but requires scanning for data storage; patient-owned
Professional CGM	Placed by provider & worn for discrete time (7-14 days); patient may be blinded or visible to data while wearing; data used to assess patterns/trends; CGM clinic-owned

CGM: continuous glucose monitor
rtCGM: real-time CGM
isCGM: intermittently scanned CGM

Diabetes Technology: *Standards of Medical Care in Diabetes - 2022. Diabetes Care* 2022;45(Suppl. 1):S97-S112.

Professional CGM – Use for a Purpose

- Identifying and correcting glucose patterns
- Use when:
  - When either rtCGM or isCGM is not available
  - Patient prefers shorter experience
  - Evaluate periods of hypoglycemia to make medication dose adjustments

"Use of professional…CGM should always be coupled with analysis and interpretation for the patient, along with education…to adjust medication and change lifestyle behaviors."

Diabetes Technology: *Standards of Medical Care in Diabetes - 2022. Diabetes Care* 2022;45(Suppl. 1):S97-S112.

Intermittently Scanned CGM (isCGM)

How to use:

- User "scans" sensor for information
- Should be scanned frequently, at a minimum once every 8 hrs
- Originally did not provide alarms or alerts, now has capability

RCTs mixed results (all compared to SMBG)[1-4]

Can be helpful for patterns of hyper- and hypoglycemia and improving A1C levels in people with diabetes on non-insulin and basal insulin regimens.

[1]Bolinder J et al. *Lancet*. 2016;388(10057):2254-2263.
[2]Davis TME et al. *Diabetes Technol Ther*. 2020;22(5):367-373.
[3]Haak T et al. *Diabetes Ther*. 2017;8(1):55-73.
[4]Yaron M et al. *Diabetes Care*. 2019;42(7):1178-1184. doi:10.2337/dc18-0166

Real-time CGM (rtCGM) – Biggest Bang for the Buck!

Manufacturer	Systems	Wear Time, days	Age Indications, years	Calibration Requirements	Related Data Apps	Reports and Computer Data Apps
Abbott	FreeStyle Libre	14	≥18 (U.S.) ≥4 (O.U.S.)	Not required	LibreLink and LibreLinkUp (for sharing data with loved ones)	Libre View
	FreeStyle Libre 2	14	≥4	Not required		
Dexcom	G6	10	≥2	Not required	Dexcom Clarity and Dexcom (for sharing data with loved ones)	Clarity
Medtronic	Guardian Connect	7	≥14	Twice daily	CareLink and Guardian Connect (for sharing data with	Carelink
	Eversense	90 (U	U.S.)	Twice		
	Eversens		U.S.)			

untry. O.U.S., ou ; U.S

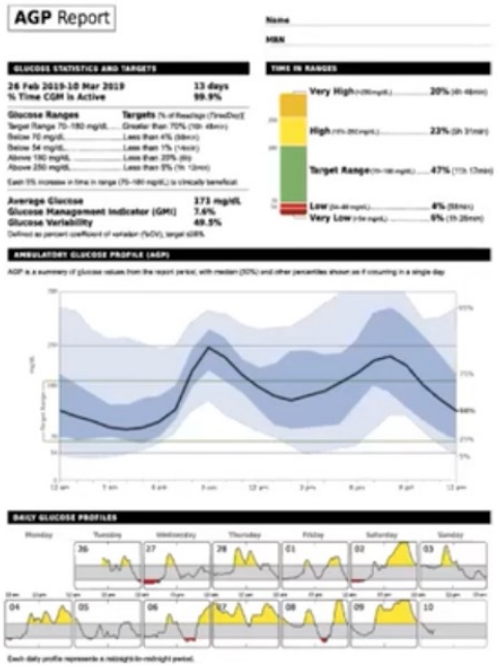
- Wear on body for 7-10 days
- Realtime alerts & feedback
- Remote data sharing with care providers
- Data connectivity to cloud

Miller EM. Using Continuous Glucose Monitoring in Clinical Practice. *Clin Diabetes*. 2020;38(5):429-438.

Real-time CGM (rtCGM)

Evidence

- Significant reductions in A1c from baseline
- Reduction in hypoglycemia
- T1DM: Children
  - Reduced A1c when used consistently
- T2DM: Reduction in A1c
  - For MDI, MDI + oral Rx & oral Rx alone



To Optimize Use

- Robust diabetes education, training & support needed
- Should be used as close to daily as possible for maximal benefit
- Still need to know how to perform SMBG to correlate lows

Foster NC et al. Diabetes Technol Ther. 2019;21(2):66-72

3 Common CGM systems

Medtronic Guardian 3 CGM System

Dexcom G6

Dexcom G6 CGM

Abbott Freestyle Libre 2 System

Medtronic Guardian 3 CGM system

Medtronic Guardian 3 CGM System

- Guardian 3 sensor applied for 7 days
- “Pushes” BG readings to a smartphone or an integrated Medtronic insulin pump
- Alerts user with high or low sugars
- Can be used as a stand-alone device with BG readings displayed on smartphone
- Can be integrated with Medtronic 630G, 670G & 770G insulin pump systems
- Needs to be calibrated twice daily with a manual blood glucose check.
- FDA-approved for ages 3 & up

Dexcom G6 CGM system

Dexcom G6

Dexcom G6 CGM

- Dexcom G6 applied for 10 days
- “Pushes” BG readings to a receiver, smartphone or Apple Watch
- Alerts user with high or low glucoses or if the glucose is rapidly climbing or falling
- Can be used as a stand-alone device with BG readings on a smartphone
- Can be integrated with either Tandem t:slim X2 insulin pump or Tubeless Omnipod insulin pump
- No manual daily BG checks needed to calibrate G6 sensor
- Dexcom G6 is FDA-approved for ages 2 up

Abbott Freestyle Libre 2 CGM

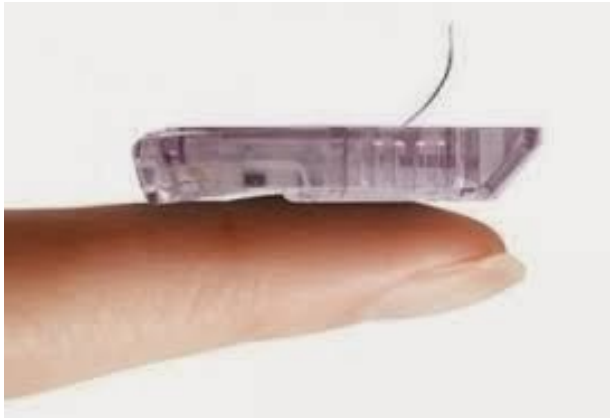
Abbott Freestyle Libre 2 System

- Libre “Flash” 2 sensor applied for 14 days
- Sensor measures glucose every few minutes
- Displays BGs when reader is “flashed” next to sensor
- An Apple or Android smartphone can be used to “read” sensor*
- New generation Libre 2, alerts user with high or low glucoses
- Libre 2 is FDA-approved for ages 4 and up.

*The smartphone app for Libre 2 is still under FDA review.

To Assist Patients to be Successful with CGM use?

- Advise to scan or check CGM frequently
  - But not too frequently!
- Set alerts/alarms to be useful & not overwhelming
- May need to occasionally check BG to confirm hypoglycemia, calibrations or CGM sensor/transmitter function



Sensor

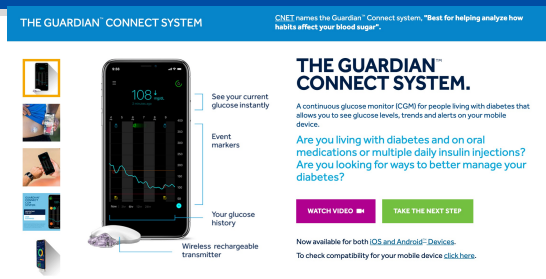
Sensor & Transmitter

Available CGMs Comparisons & Specifications[1,2]

	Dexcom® G6	Freestyle Libre 14 day	Freestyle Libre 2	Medtronic Guardian™ 3	Eversense® and Eversense® XL
Manufacturer	Dexcom	Abbott	Abbott	Medtronic	Senseonics
CGM group	rtCGM	isCGM	isCGM	rtCGM	rtCGM
Sensor technology	Enzyme electrode	Enzyme electrode	Enzyme electrode	Enzyme electrode	Optical fluorescence
Fingerstick calibration	0 (factory calibrated)	0 (factory calibrated)	0 (factory calibrated)	2/day minimum	2/day minimum
Requires fingerstick confirmation	No	No	No	Yes	Yes
Approved for ages	2+ years	18+ years	4+ years	7+ years (with 670G pump) 14+ years with Guardian™Connect	18+ years
Sensor application	Abdomen	Back of upper arm	Back of upper arm	Back of upper arm and abdomen	Upper arm (implanted)
Warm up	2 hours	1 hour	1 hour	2 hours	24 hrs
Wear length	10 days	14 days	14 days	7 days	90 days/180 days
Transmitter design	Three-month use transmitter separate from sensor	Fully disposable transmitter integrated with sensor patch	Fully disposable transmitter integrated with sensor patch	Rechargeable transmitter separate from sensor	Rechargeable, transmitter separate from sensor
Alarms for high and lows	Yes	No	Yes	Yes	Yes
Data Display	Receiver, Dexcom® G6 app for Android, iPhone, smartwatches, Tandem t:slim X2 pump	Reader, FreeStyle LibreLink app for Android and iPhone	Reader (mobile app not yet available in US)	630G or 670G pump, Guardian™ Connect app for Android and iPhone	Eversense® app for Android and iPhone
Software for analysis	Dexcom® Clarity	FreeStyle Libre LibreView	FreeStyle Libre LibreView	Carelink™	Eversense® DMS
Remote monitoring	Dexcom® Share	LibreLinkUp	LibreLinkUp	CareLink™ Connect	Eversense® Now
Integration with pump	Tandem T:slim Control IQ and Basal IQ	No	No	The Guardian™ 3 is part of the 670G hybrid closed-loop insulin pump	No
Medicare coverage	Yes	Not known	No	Yes	Yes

[1]Integrated Diabetes Services: https://integrateddiabetes.com/continuous-glucose-monitor-comparisons-and-reviews/
[2]diaTribe Learn – Making Sense of Diabetes: https://diatribe.org/continuous-glucose-monitors-cgms#3

What is the “Guardian Connect” CGM system?



- Stand alone CGM for patients on MDIs of insulin
- Leverages mobile technology (smartphone) & advances by Medtronic
- Guardian™ Connect CGM allows:
  - Monitoring of glucose levels trends on mobile device
  - Notification with alerts up to 60 minutes in advance of high & low BG events*
  - Connection with healthcare professionals (HCPs) via CareLink™ platform
  - Care partners to monitor remotely
  - HCP therapy optimization when connected to internet via wifi/mobile data

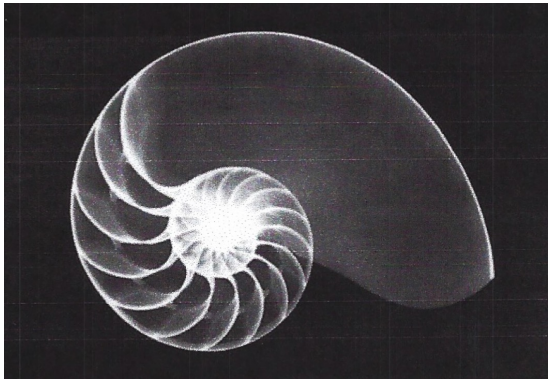
*Alerts must be set to receive predictive alerts

Approach to the Patient – DM Technology

- **Engage & Explore**
- **Screen & Monitor**
- **Use Technology**
- **Customize**
- **Support & Follow**

Five Practices for Promoting Patient-Centered Care[1,2]

- Prepare with intention
- Listen intently & completely
- Agree on what matters most
- Connect with the patient's story
- Explore emotional cues



JW Chambered Nautilus Approach…

[1]Sanders L, Fortin AH 6th, Schiff GD. Connecting with patients—the missing links. JAMA. 2020;323(1):33-34
[2]Zulman DM, Haverfield MC, Shaw JG, et al. Practices to foster physician presence and connection with patients in the clinical encounter. JAMA. 2020;323(1):70-81.

Acknowledgement & Affirmation

- Identification of Barriers
  - Based on patient's answers to your questions
- Use Metaphors – "This is hard…"
  - "Diabetes care is like managing a 3-ring circus…"
  - "BG control is like trying to carry a flat pan of water across the floor without spilling a drop…"
- But…always give positive reinforcement
  - Underscore successes & reiterate support
  - "I'm in this alliance with you."

Patient-Centered Approach to DM Managment

Consider patient, disease features, psychology & social network that impact management

Hypoglycemia risk, disease duration, life expectancy, early signs of established vascular complications, etc.

Determine impact of features above on A1C goal & adjust therapeutic strategy accordingly

Revisit & readjust strategy as factors change

ADA.Glycemic Targets. Approach to Individualization of *Diabetes Care.* 2022;45(Suppl.1):S83-S96.

Comprehensive Goals Of Diabetes Management

- **Set glycemic targets to reduce microvascular & macrovascular CVD events**
  - A1C targets
  - Ambulatory Glucose Profile targets
    - BGM - Fasting & postprandial glycemia goals
    - CGM – "Time in Range" & glucose variability goals
- **Consider T2DM therapies in view of pathogenesis**
  - Lifestyle Interventions
  - Pharmacologic interventions aimed at:
    - Minimizing hypoglycemia
    - Controlling glycemic variability to maximize "Time in Range"
- **Consider therapies for prevention or management of comorbidities**
  - CVD, HTN, CHF – aspirin, anti-platelet, antihypertensive agents
  - DKD – RAAS agents
  - Dyslipidemia – statins, ezetimibe, fibrates, fenofibrates, Icosapent ethyl, PCSK9 inhibitors

SMBG = Self-Monitoring of Blood Glucose
CGM = Continuous Glucose Monitoring
RAAS = Renin-Angiotensin-Aldosterone System

Prevention or Delay of Type 2 Diabetes andAssociated Comorbidities: *Standards of Medical Care in Diabetes - 2022. Diabetes Care* 2022;45(Suppl. 1):S39-S45

Comprehensive Goals Of Diabetes Management

- **Set glycemic targets to reduce microvascular & macrovascular CVD events**
  - A1C targets
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Prevention or Delay of Type 2 Diabetes andAssociated Comorbidities: *Standards of Medical Care in Diabetes - 2022. Diabetes Care* 2022;45(Suppl. 1):S39-S45

BG Meter vs CGM Strategies

BG Meter

- Measures blood glucose (BG)
- Finger prick 2-8x/day
- Drop of blood
- Measures BG in moment of time
- Must wake up for nighttime testing
- Time consuming
- Test kit required
  - Strips, lancets, meter
- Inconvenient & unpleasant to bring along & use in public

CGM

- Measures interstitial fluid (ISF) glucose
- Sensors continuously measure glucose
  - **Every 5 min = 288/day**
- isCGM self-scans variable 2-10+/day
- Scanning takes 1 second & can be done anytime in public
- Scanned sensor holds data for 8 hours & Reader records for 90 days
- rtCGM receiver collects/trends data
- Glucose trends can be monitored by sensor day or night
- Most don't feel sensors

CGM Use Prevalence & Access Challenges[1,2]

- CGM use is estimated **15%** of people with T1DM in the US
- Access has progressed with new Medicare coverage rules
- Access challenges remain:
  - Access/Rising Costs
  - Patient education
  - Therapeutic inertia
  - Variation in provider practices

[1]Cefalu WT, Kaul S, Gerstein HC, et al. Cardiovascular Outcomes Trials in Type 2 Diabetes: Where Do We Go From Here? Reflections From a *Diabetes Care* Editors' Expert Forum. *Diabetes Care*. 2018;41(1):14-31.
[2]Gerard SO, Ritchie J. Challenges of Inpatient Glycemic Control. *J Nurs Care Qual*. 2017;32(3):267-271.

A Word about & Good News on Medicare Coverage…

New Medicare Coverage Make CGMs More Accessible

- July 18, 2021: Medicare permanently eliminated requirement of 4x/day fingerstick in order to qualify for CGM coverage
- If looking for a CGM for Medicare patients, there is now a simplified, fingerstick-free approval process for coverage.
- Out-of-pocket costs for CGM will depend on a few factors, like what Medicare benefit plans looks like & where device is secured.
- Check for Diabetes DME distributers in your area or call 1-800-MEDICARE) to determine cost.

Dexcom Demo Kit

Dexcom CGM – Free 10 Day Trial

Dexcom Demo Free 10-day Trial:

https://www.dexcom.com/get-started-cgm/154

Dexcom G6 CGM Application

- How to apply?
- English: https://www.youtube.com/watch?v=dBOgdsfeM-A
- Spanish: https://youtu.be/TNvXX41DND8

Blood Glucose Meter Use | Serum vs ISF glucose

- An estimated **70%** of patients using diabetes medication purchased SMBG strips[1]
- BG measures serum glucose (SG) & CGMs read interstitial fluid (ISF) glucose
- Serum glucose readings gives most accurate reading & is 5-10 min ahead of ISF glucose
- When SG levels decrease, sensor readings in ISF **may be higher** than the serum glucose reading (& vice versa)

[1]Kjome RL, Granas AG, Nerhus K, Roraas TH, Sandberg S. The prevalence of self-monitoring of blood glucose and costs of glucometer strips in a nationwide cohort. *Diabetes Technol Ther*. 2010;12(9):701-705.

Systematic Approach to BGM/CGM reports

Minimize

- Hypoglycemia
- Glucose variability
- Hyperglycemia

Priorities

- Reduce hypoglycemia (TBR)
- Increase Time in Range (TIR)

BG Meter or CGM AGP Download Report

Ambulatory Glucose Profile (AGP)

AGP Report

Name

MRN

GLUCOSE STATISTICS AND TARGETS

26 Feb 2019 - 10 Mar 2019	13 days
% Time CGM is Active	99.9%

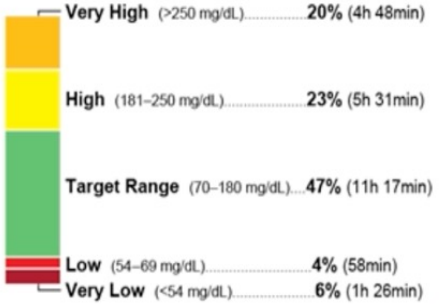
Glucose Ranges	Targets [% of Readings (Time/Day)]
Target Range 70-180 mg/dL	Greater than 70% (16h 48min)
Below 70 mg/dL	Less than 4% (58min)
Below 54 mg/dL	Less than 1% (14min)
Above 250 mg/dL	Less than 5% (1h 12min)

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

Average Glucose	173 mg/dL
Glucose Management Indicator (GMI)	7.6%
Glucose Variability	49.5%

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

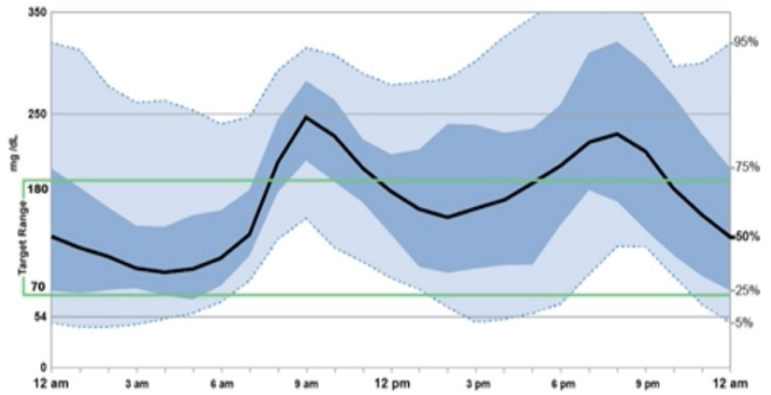
TIME IN RANGES



Very High (>250 mg/dL)	20% (4h 48min)
High (181–250 mg/dL)	23% (5h 31min)
Target Range (70–180 mg/dL)	47% (11h 17min)
Low (54–69 mg/dL)	4% (58min)
Very Low (<54 mg/dL)	6% (1h 26min)

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.



If Using a BG meter, explore indications for a transition to CGM

- Any MDI therapy?
- Not meeting TIR and/or A1c goals?
- Frequent hypoglycemia and/or glucose variability?
- Patient motivation for BG meter use?

MDI: Multi-Dose Injection; TIR: Time in Range

Approach to Patient with a BG meter or CGM

- **Invite patients to show you the BG/CGM review of data**
  - Encourage patient use of data review options

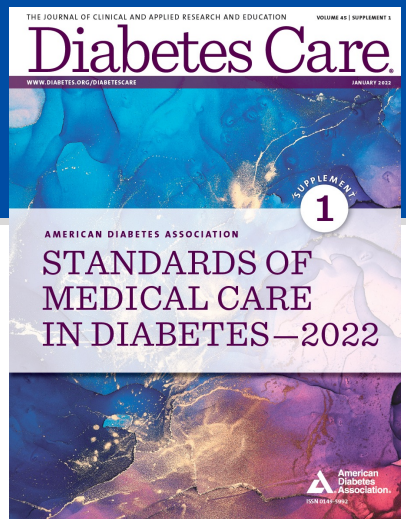
- **COMPILE DATA! Construct AGP from BG Meter or CGM**
  - % Time Below Range (TBR)
    - Any patterns for hypos?
  - % Time in Range (TIR)
  - % Time Above Range (TAR)
    - Any patterns for hyperglycemia?
  - Pre-meal averages
  - 7-14-30-90 Day Averages
    - Focus in on 14–30-day averages

- **BG Meter auto-data review usually commences after power up**

- **Consider the "3-minute drill"**

The “3-minute drill”

Proactive Management of Type 2 Diabetes



Diagnosis

Lifestyle modification & Diabetes Self-Management Education & Support (DSMES)

Glucose Control

Improve glycemic control to reduce symptoms & microvascular risk

Cardiovascular Risk

Reduce macrovascular risk especially by controlling lipids & blood pressure

Comorbidities

Manage co-morbidities (obesity, CVD, CKD, depression, fatty liver, eye & neuropathic disease)

Clinic Processes to Address Diabetes Standards of Care

How do you do all this in 20–25-minute visits?

1. Facility support to implement standards of care for patients with DM
2. Systematic approach to patient encounters
3. Smart phrases!

How to Implement in Your Practice?

Recommend utilizing a diabetes care team & reviewing roles

Become familiar & comfortable with most common devices used

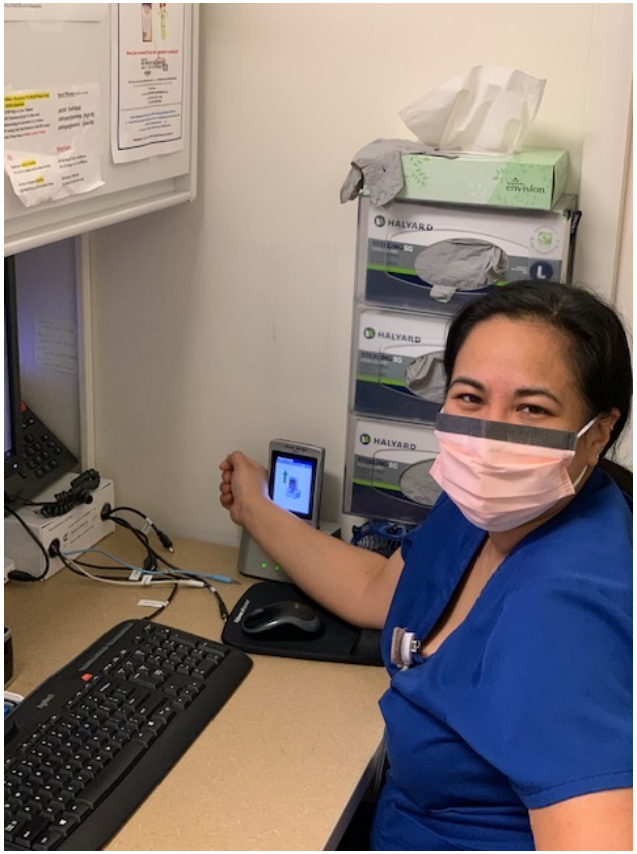
Ensure patients know usernames & passwords for online accounts

Each patient started on technology should be added to clinic's portal account for data access & shareability

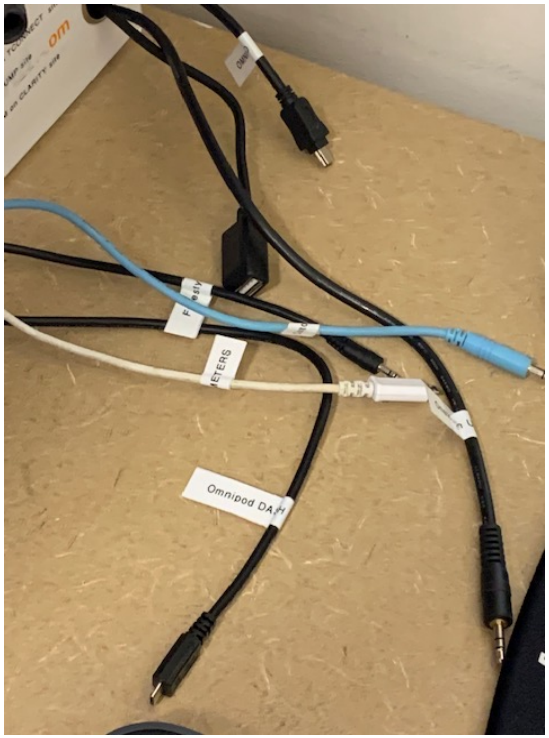
Clinic Support - YDC Team

Clinicians
Nurses
Dieticians
Medical Assistants
Administrative Staff

Clinic Support – "Crackerjack" Medical Assistants



MA manages BGM/CGM downloads & creates reports



MA has device connections & BG/CGM platform apps

MA obtains POC A1c

BG Meter & CGM Downloads – Links for Software Access

- Medtronic CareLink Quick Reference Guide: (CGM)
  - Provider link: https://CareLink.Medtronic.com
- Dexcom CLARITY for Healthcare Professionals: (CGM)
  - Provider link: https://clarity.dexcom.com/professional/
- LibreView website: (CGM)
  - Provider link: https://provider.freestyle.abbott/ca-en/home/libreview.html
- Glooko Remote Patient Management Software (BG meters)
  - Provider link: https://glooko.com/providers/
  - BG meter compatibility link: https://glooko.com/compatibility/
- TIDEPOOL – (BG Meters & CGMs "*So many devices — one place to upload!*")
  - Provider link: https://provider.tidepool.org/
  - Compatibility link: https://www.tidepool.org/devices

Systematic Approach for Providers

Engage & Explore

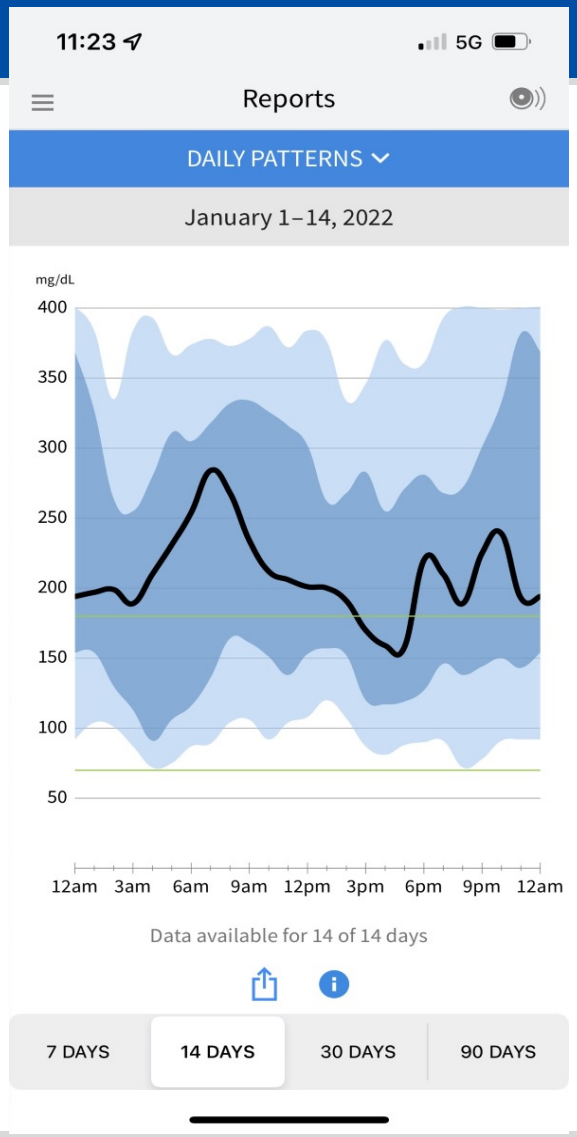
Screen & Monitor

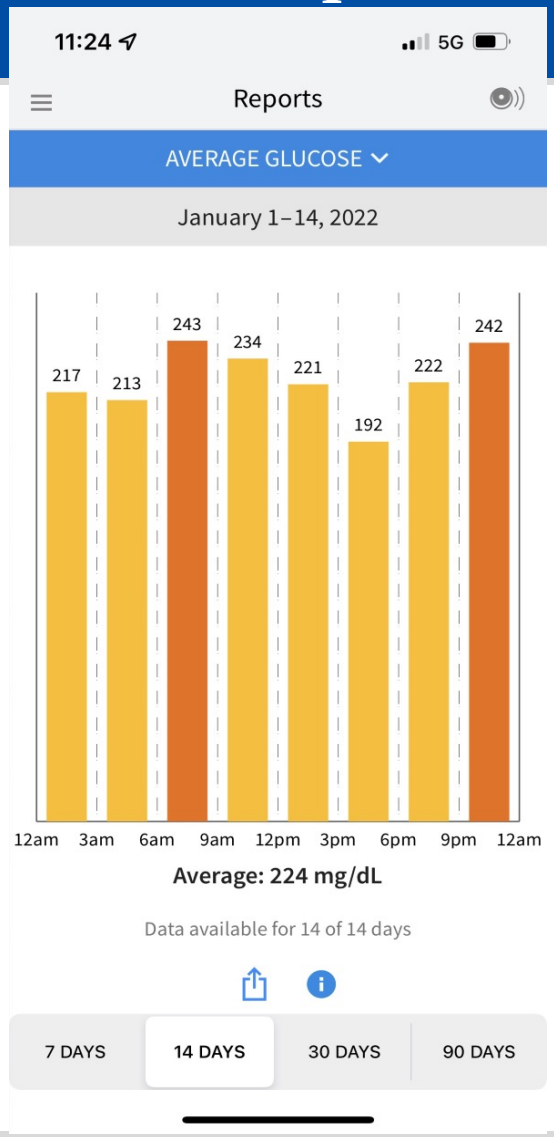
Use Technology

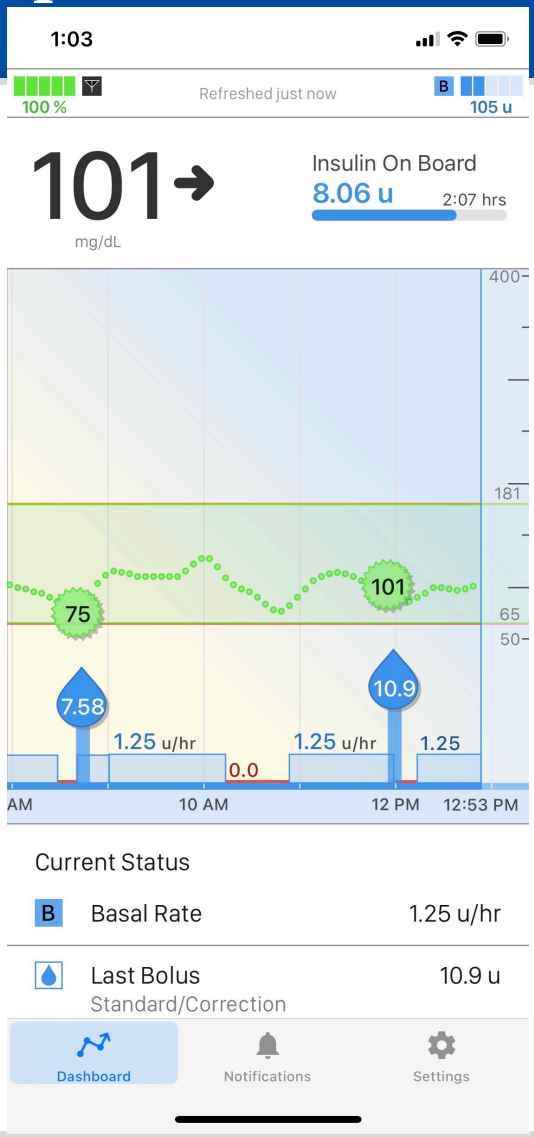
Customize

Support & Follow

No CGM Data Download Report? No problem!







Common Pitfalls & Quick Fixes

- **BG meter is not set for correct date & time**
  - If not, hand it to your "Crackerjack" MA to set correctly
  - Always thank them & laud about them to the Clinic Manager
- **Patient forgot to hand BG meter to MA for downloading**
  - Hand it back to your "Crackerjack" MA to download
  - Always thank them & laud about them to the Clinic Manager
- **Patient doesn't know how to access reports on smartphone**
  - Ask them permission to give it a go yourself
- **Patient forgets BG meter or CGM receiver in car or at home**
  - ***"Always bring your BG meter or CGM receiver to clinic visits!"***

Challenges to Diabetes Technology Implementation

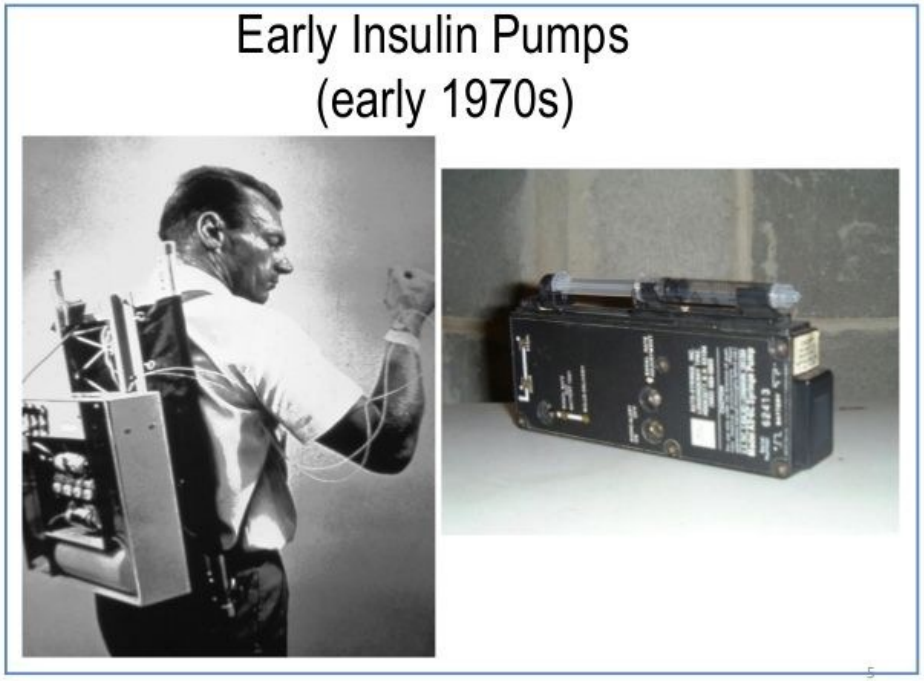
- Increased clinical staff time for downloading data
- Education required to learn analysis & interpretation skills for CGMs & insulin pumps
- Different software interfaces for each company

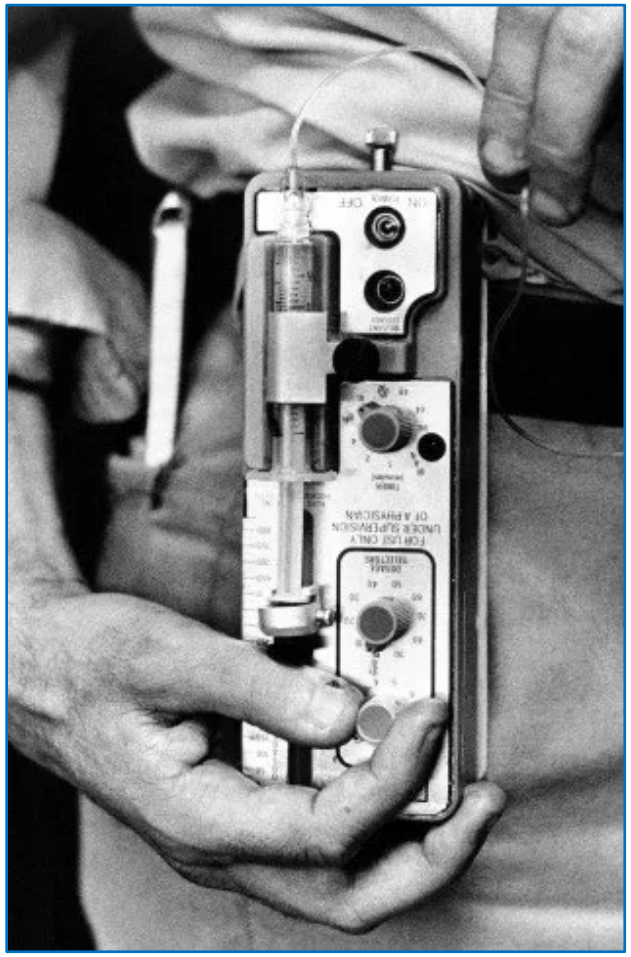
Clinical Challenges of Multi-Dose Insulin Therapy

- Taking multi-daily injection (MDI) insulin can be challenging.[1-4]
- Clinicians struggle with trying to optimize patient's insulin regimens.
- Lack of dosing data is a significant barrier to optimizing insulin management[5]
- Patients omit doses
  - Missing 2 meal-related doses per day can lead to an increase in A1C of 0.4%[3,6,7]
- 2/3 of patients using MDI therapy need help calculating their insulin doses.
- 60% of insulin doses are taken with some insulin already on-board.[3,6,7]

[1]Norlander LM, Anderson S, Levy CJ, et al. *Diabetes.* 2018;67(suppl 1):992-P
[2]Randløv J, Poulsen JU. *J Diabetes Sci Technol.* 2008;2(2):229-235.
[3]Cavanaugh K, Huizinga MM, Wallston KA, et al. *Ann Intern Med.* 2008;148 (10):737-746.
[4]Schmidt S, Nørgaard K. *J Diabetes Sci Technol.* 2014;8(5):1035-1041.
[5]Klonoff DC, Kerr D. *J Diabetes Sci Technol.* 2018;12(3):551-553.
[6]Garg SK, Bookout TR, McFann KK, et al. *Diabetes Technol Ther.* 2008;10(5):369-375.
[7]Zaugg SD, Dogbey G, Collins K, et al. *Clin Diabetes.* 2014;32(4):152-157.

Original Insulin Pumps

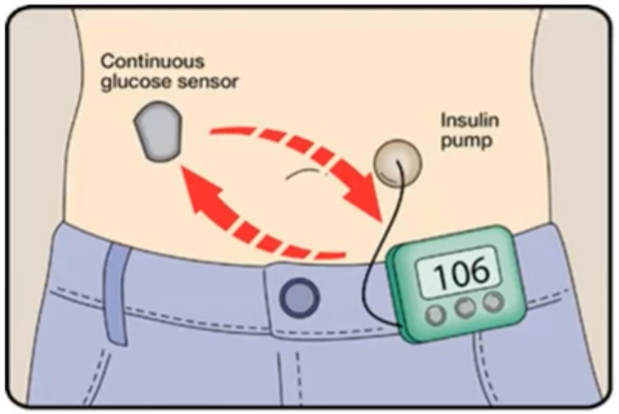




Insulin Pump & DME today

Hybrid Closed Loop (HCL) therapy

Hybrid Closed Loop (HCL) therapy



CGM → algorithm → Insulin delivery

In-Pen for Multiple Daily Injections – MDI Therapy

A SYSTEM THAT MAKES LIFE EASIER FOR YOUR PATIENTS

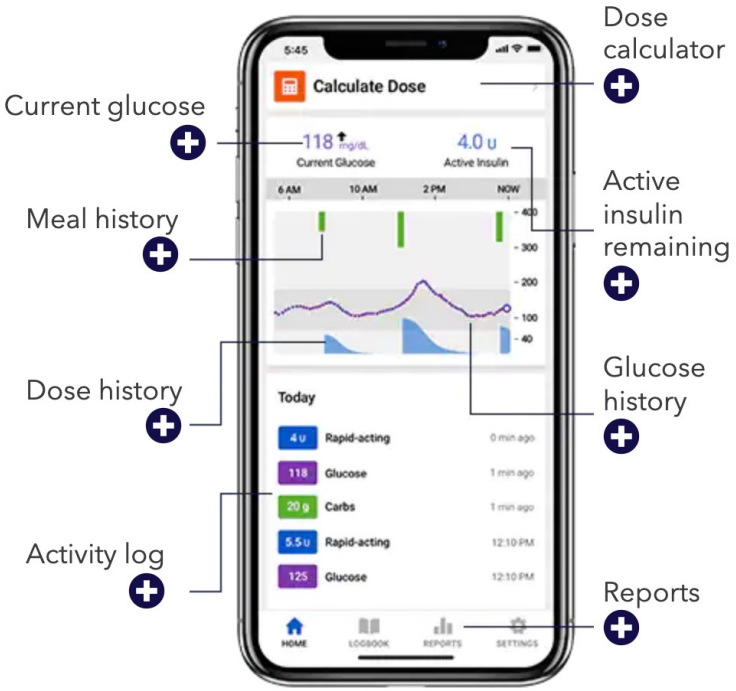
InPen helps MDI users take the right amount of insulin at the right time, thanks to real-time tracking and decision support

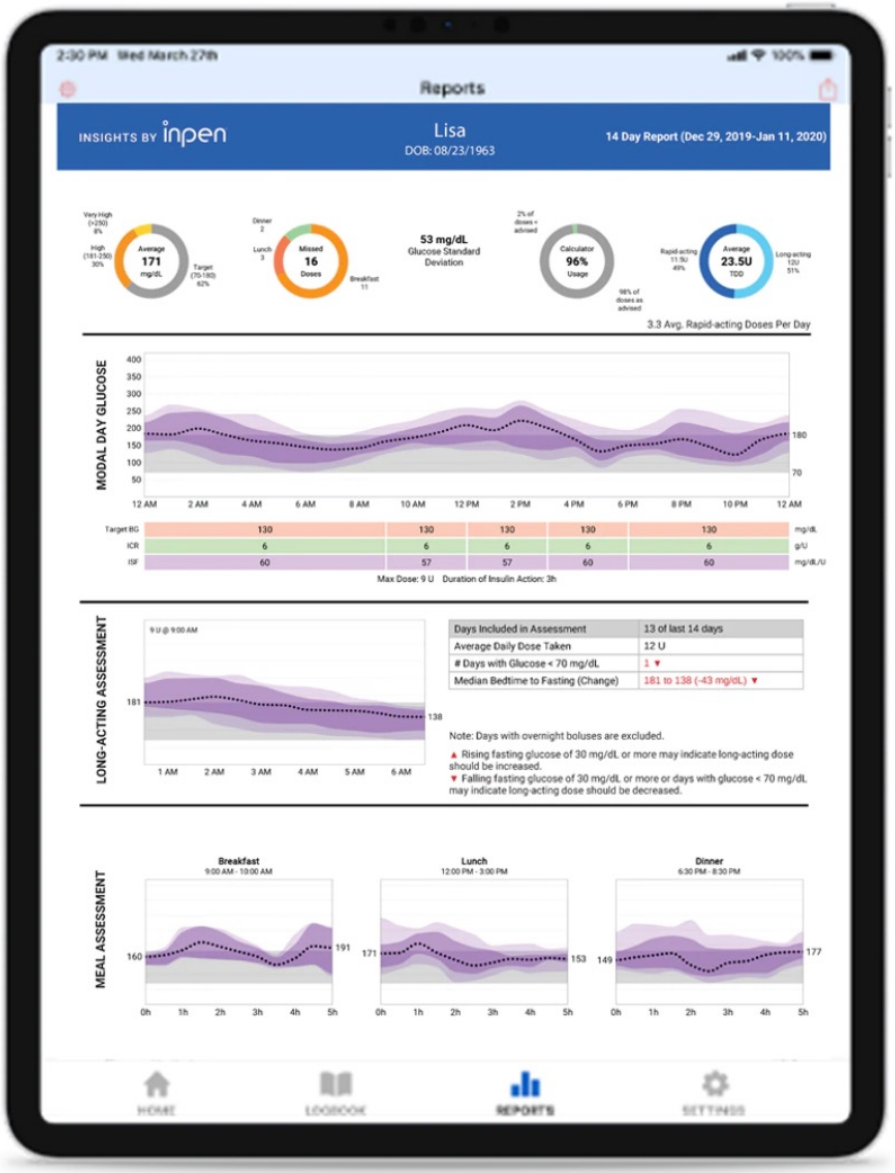
- ✓ Tracks active insulin
- ✓ Reminds user to dose
- ✓ Calculates personalized doses
- ✓ Automatically logs doses
- ✓ Syncs with CGMs and glucose meters

Medtronic: https://www.medtronic.com/us-en/healthcare-professionals/products/diabetes/smart-insulin-pen/inpen-smart-insulin-pen-system.html

In-Pen for Multiple Daily Injections – MDI Therapy

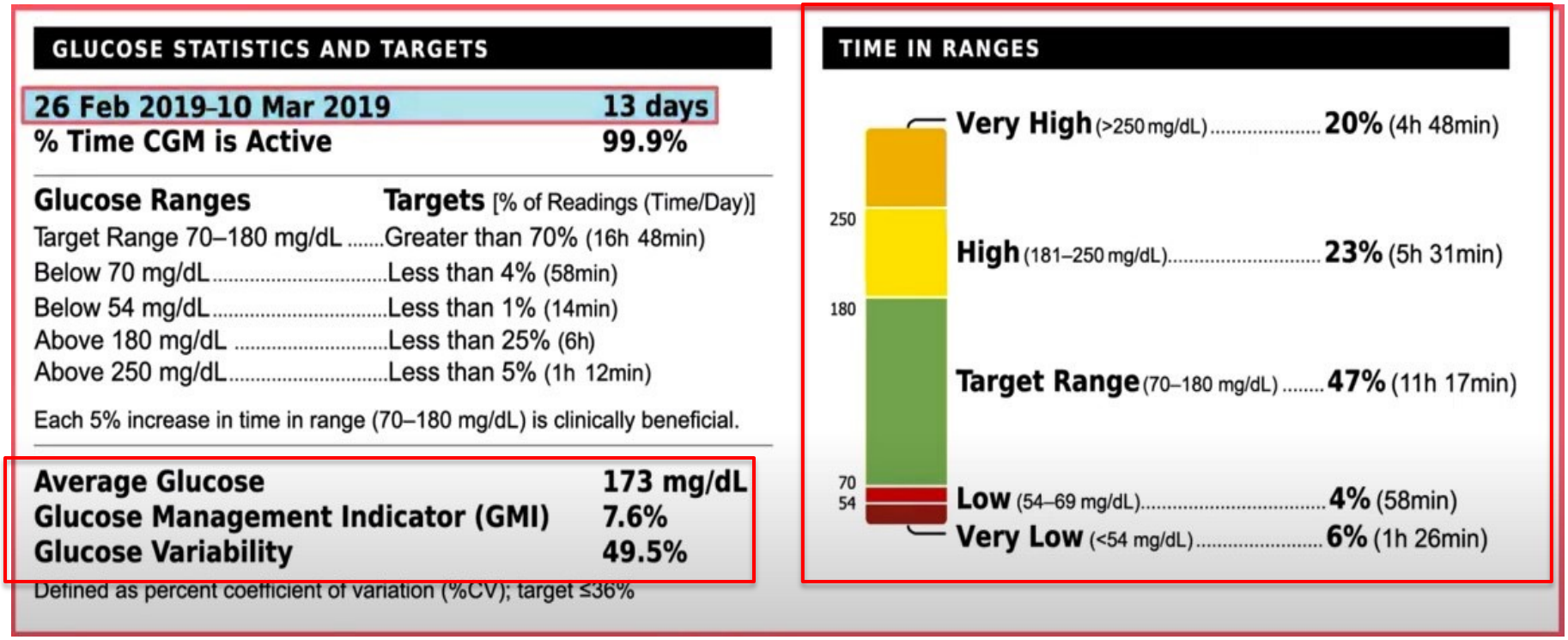
The app





Overview Report

CGM Report Dashboard



GLUCOSE STATISTICS AND TARGETS

26 Feb 2019–10 Mar 2019	**13 days**
% Time CGM is Active	**99.9%**

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	**173 mg/dL**
Glucose Management Indicator (GMI)	**7.6%**
Glucose Variability	**49.5%**

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

TIME IN RANGES

250
180
70
54

Very High (>250 mg/dL) **20%** (4h 48min)

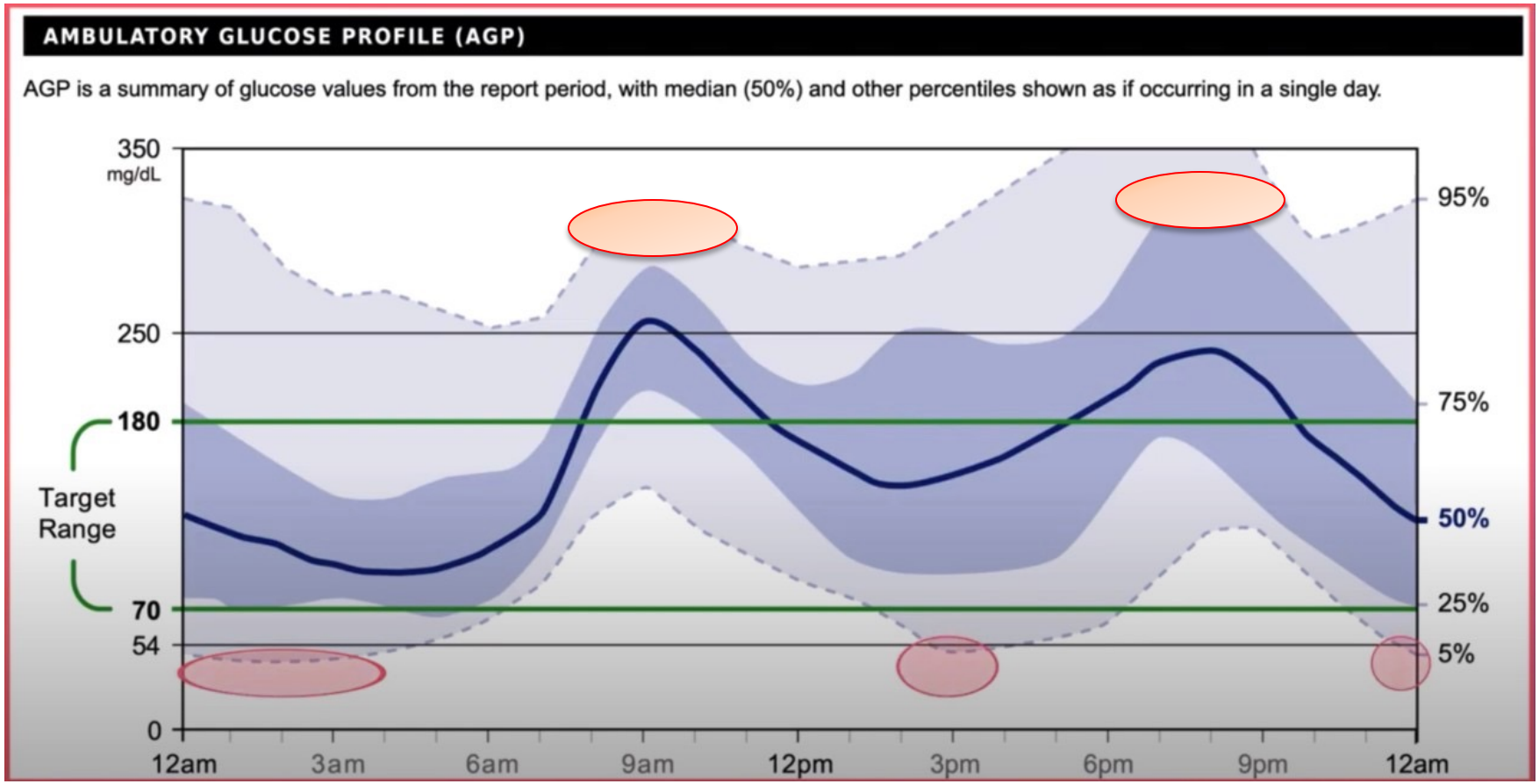
High (181–250 mg/dL) **23%** (5h 31min)

Target Range (70–180 mg/dL) **47%** (11h 17min)

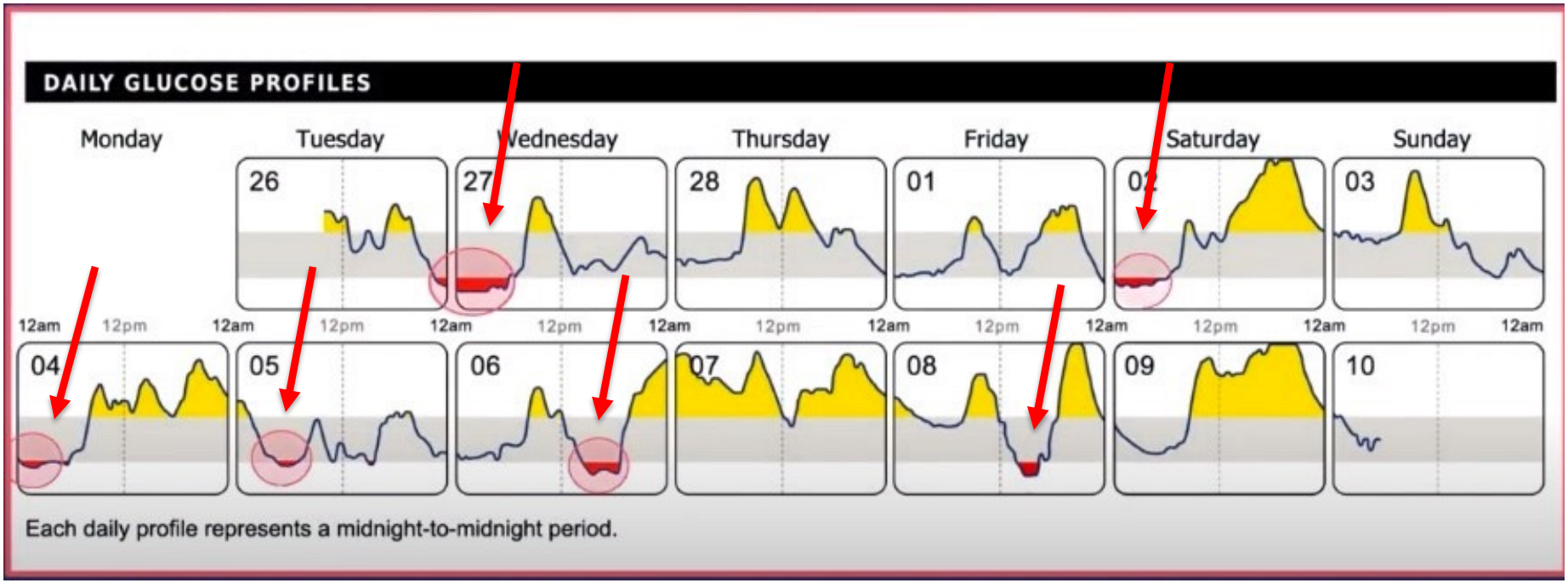
Low (54–69 mg/dL) **4%** (58min)

Very Low (<54 mg/dL) **6%** (1h 26min)

Ambulatory Glucose Profiles (AGPs) – Report Period Summary



Daily Snapshot AGPs



Systematic Approach to BG/CGM reports

Minimize

- Hypoglycemia
- Glucose variability
- Hyperglycemia

Priorities

- Reduce hypoglycemia (TBR)
- Increase Time in Range (TIR)

Case 1

62 yoM with a PMH of T2DM, CAD s/p CABG, s/p Heart transplant, HTN, HLD, Stage 3 CKD

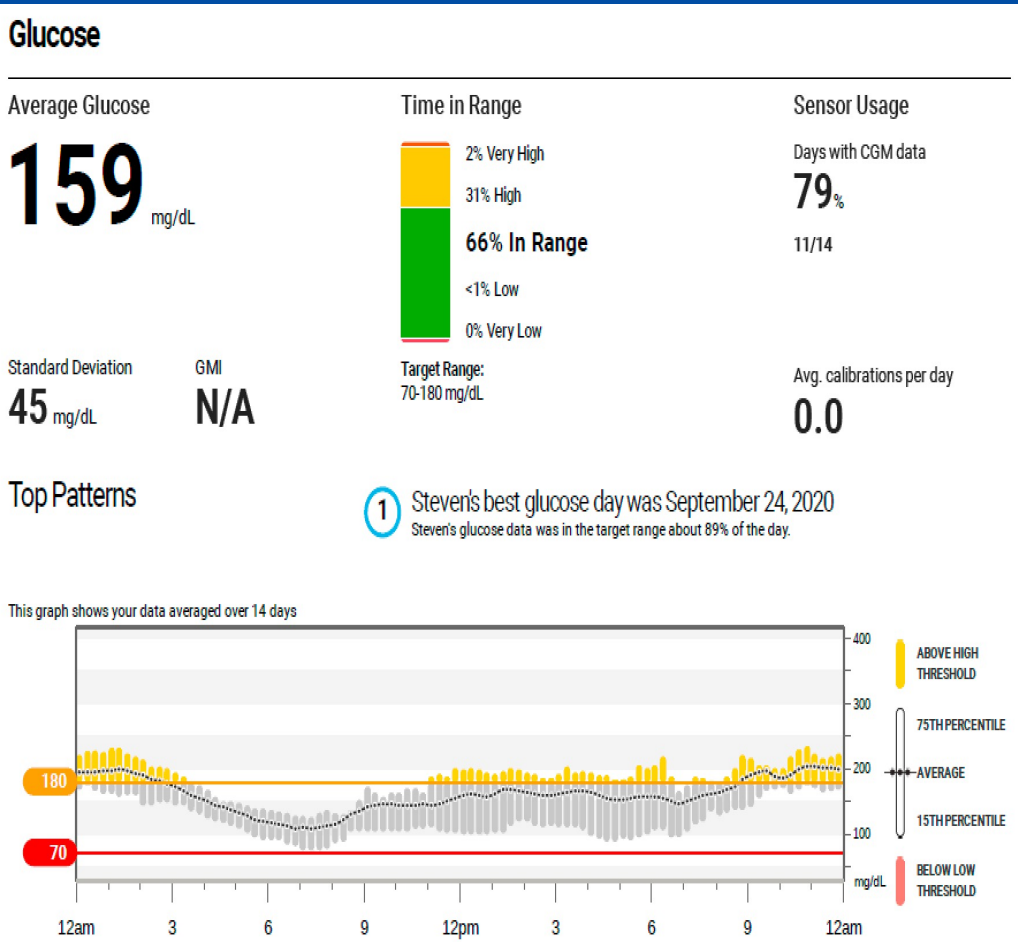
DM Rx:

- Tresiba 35 U at HS (basal insulin)
- Humalog 0u/5u/12u for B/L/D pre-meals
- Empagliflozin 10mg daily (SGLT2i)

Glucose Monitoring:

- Uses DexCom G6 CGM

Case 1 – CGM Data period: 9-23-21 to 10-6-2021



Glucose Data Report:

Date of Interpretation:	1/18/2022
Data period:	9/23/21-10/6/2021
Readings:	~4000
Mean BG (mg/dL):	159
Range BG mg/dL):	68-204
% Hyperglycemia (>180):	33%
% at Target (70-180):	66%
% Hypoglycemia (<70):	1%

Average BG (mg/dL) values by meals:

AC Breakfast (FBG):	115
AC Lunch:	160
AC Dinner:	150
HS:	180

1. Trends: steep drop overnight to & mild hypo range by AM
2. PPG spikes to the 200s after supper, sometimes up all night.

Case 1 – Assessment/Plan

Lab Results		
Component	Value	Date
HGBA1C	6.7	10/07/2021
HGBA1C	6.4	06/18/2021
HGBA1C	8.7 (H)	03/16/2021

Assessment:

T2DM - control is quite good.

- BG is trending low in early AM & may be on too much Tresiba.
- BG pikes after supper & are an issue.

Plan:

- **T2DM:**
  1. Decrease Tresiba to 32 U to curb AM lows
  2. Increase supper Humalog to 14 U.
  3. Continue Jardiance.

- **CKD-3B:** Jardiance still safe & effective with GFR 41-49; Followed by Nephrology.
- **CVD Risk Reduction:** BP & lipids seem well controlled in past. FLP due for repeat.
- **RTC in 3 months**

Case 2

62 yoM with a PMH of T2DM, Obesity, OA s/p bilat TKRs, Kidney stones & UTIs.

DM Rx:

- Glipizide XL 10mg daily before PM meal (SU)
- Metformin XR 2000mg daily
- Pioglitazone 30mg daily (TZD)

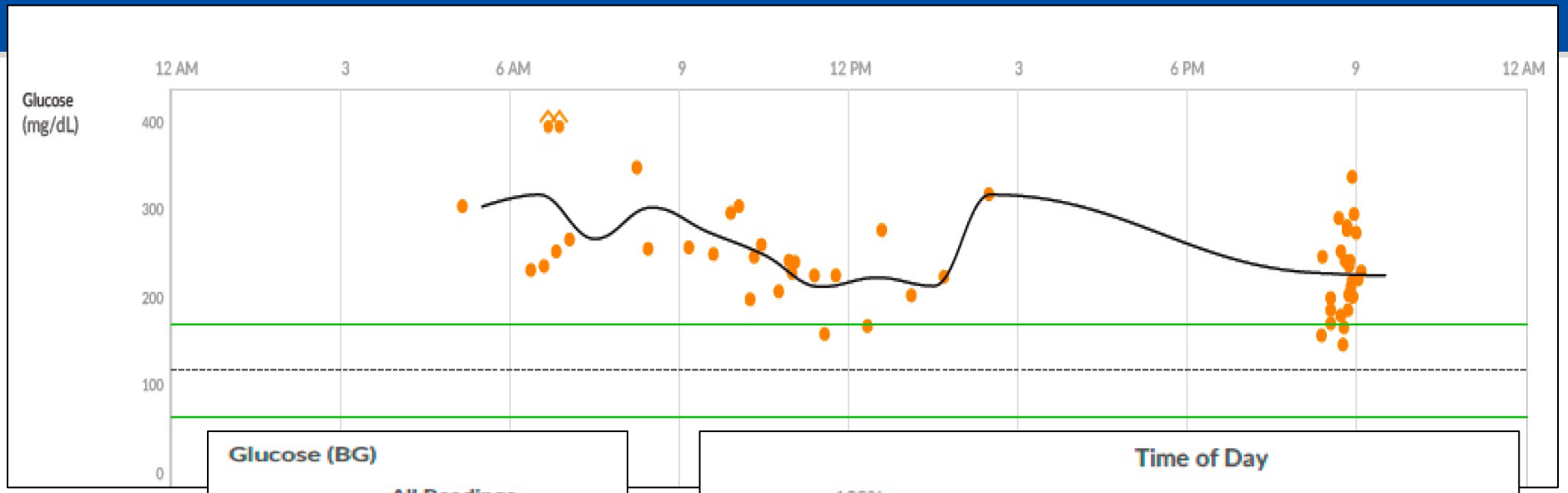
DM Rx Intolerances/Contraindications:

- Jardiance - UTI's (SGLT2i)
- Previously tried Ozempic (GLP-1) but had mild GI upset & stopped

Glucose Monitoring:

- Using Libre isCGM

Case 2 – isCGM Data period: 9-8-21 to 10-7-2021



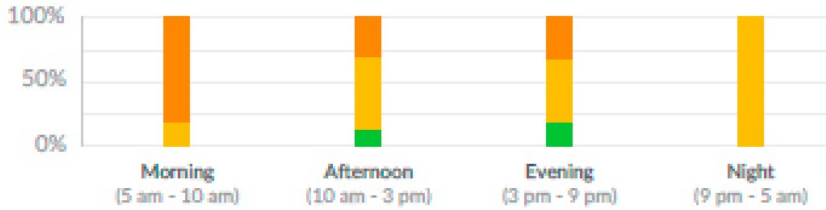
Glucose (BG)

All Readings

Very High	43%	> 250 mg/dL
High	46%	181-250 mg/dL
Target Range	11%	80-180 mg/dL
Low	0%	54-79 mg/dL
Very Low	0%	< 54 mg/dL

Average	250 mg/dL
SD	56 mg/dL
Readings/Day	1.8
Median	245 mg/dL
Highest	450 mg/dL
Lowest	157 mg/dL

Time of Day



	Morning (5 am - 10 am)	Afternoon (10 am - 3 pm)	Evening (3 pm - 9 pm)	Night (9 pm - 5 am)
Readings	12	16	24	2
Average (mg/dL)	301	240	232	233
SD (mg/dL)	68	41	47	6

1. AGP: 11% TIR & 89% TAR with no hypos

2. Pre-meal average 200-300's suggesting insulinopenia +/- insulin resistance

Case 2 – Assessment/Plan

Component	10/7/2021	3/26/2021	1/22/2021
HbA1C, POC 4.0 - 6.0 %	10.1	7.6	7.0

Assessment:

T2DM – uncontrolled

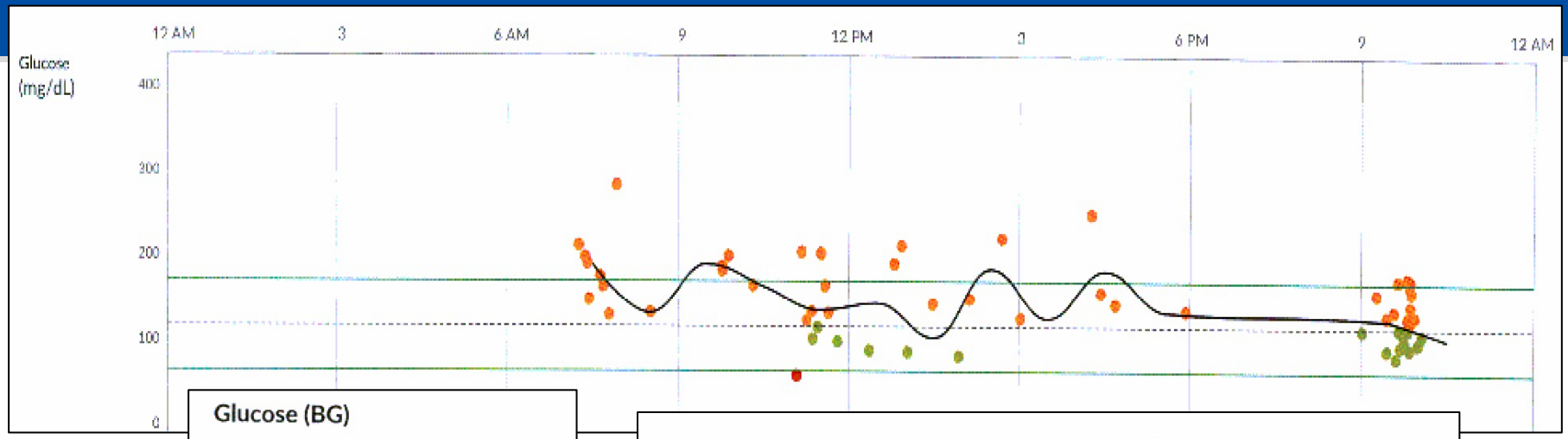
- A1c: 10.1% compared to last of 7.6%
- AGP: 11% TIR & 89% TAR no hypos
- Pre-meal averages: 200-300's suggesting increased insulinopenia +/- insulin resistance
- Weight up by 10lbs since last visit

Plan:

- **T2DM:**
  1. START Tresiba 20 units in AM (wt based: 0.2 x kg x 66%)
  2. Retrial of GLP-1 – Start Trulicity 0.75mg sc weekly – wt, glycemia, MACE benefits
  3. Call the for any persistent, intolerable GI side effects
  4. CONTINUE Metformin, Glipizide XL, Pioglitazone 30mg daily
  5. Initiate individualized weight loss considerations & activity plan as directed

- **RTC in 3 months**

Case 2 – 3 Month Follow-up: 12-23-21 to 1-21-2021



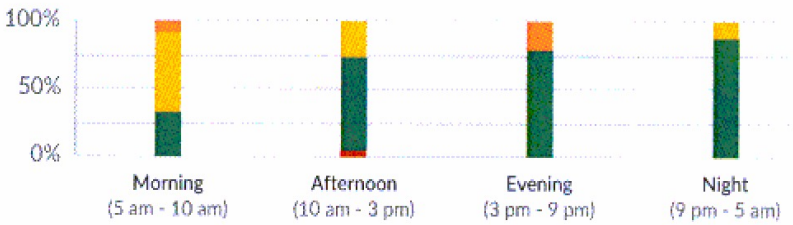
Glucose (BG)

All Readings

Very High	3%	> 250 mg/dL
High	24%	181-250 mg/dL
Target Range	71%	80-180 mg/dL
Low	2%	54-79 mg/dL
Very Low	0%	< 54 mg/dL

Average	156 mg/dL
SD	42 mg/dL
Readings/Day	2.1
Median	147 mg/dL
Highest	288 mg/dL
Lowest	73 mg/dL

Time of Day



	Morning (5 am - 10 am)	Afternoon (10 am - 3 pm)	Evening (3 pm - 9 pm)	Night (9 pm - 5 am)
Readings	12	19	5	26
Average (mg/dL)	193	152	173	138
SD (mg/dL)	39	47	48	27

1. **AGP: 71% TIR & 27% TAR with no significant or frequent hypos**
2. **FBG average above goal: 193mg/dL**

Case 2 – 3 Month Follow-up

Component	1/21/2022	10/7/2021	3/26/2021
A1C, POC 4.0 - 6.0 %	7.7	10.1	7.6

Assessment:

T2DM – uncontrolled but significantly improved trends & tolerating Trulicity (GLP-1)

- A1c: 7.7% compared to last 10.1%
- AGP: 71% TIR & 27% TAR with no significant/frequent hypos
- FBG average > goal: 193mg/dL
- 5 lb weight loss

Plan:

- **T2DM:**
  1. Increase Tresiba to 22 units
  2. Increase Trulicity to 1.5mg weekly
  3. Call the for any persistent, intolerable GI side effects
  4. Continue Metformin, Glipizide XL, Pioglitazone 30mg daily
  5. Continue using isCGM & 4-6x daily
  6. Continue with individualized weight loss considerations & activity plan as directed
- **RTC in 3 months**

Case 3

60 yoM with a PMH of T2DM, HTN, HLD, PE/DVT on lifelong Xarelto, Obesity.

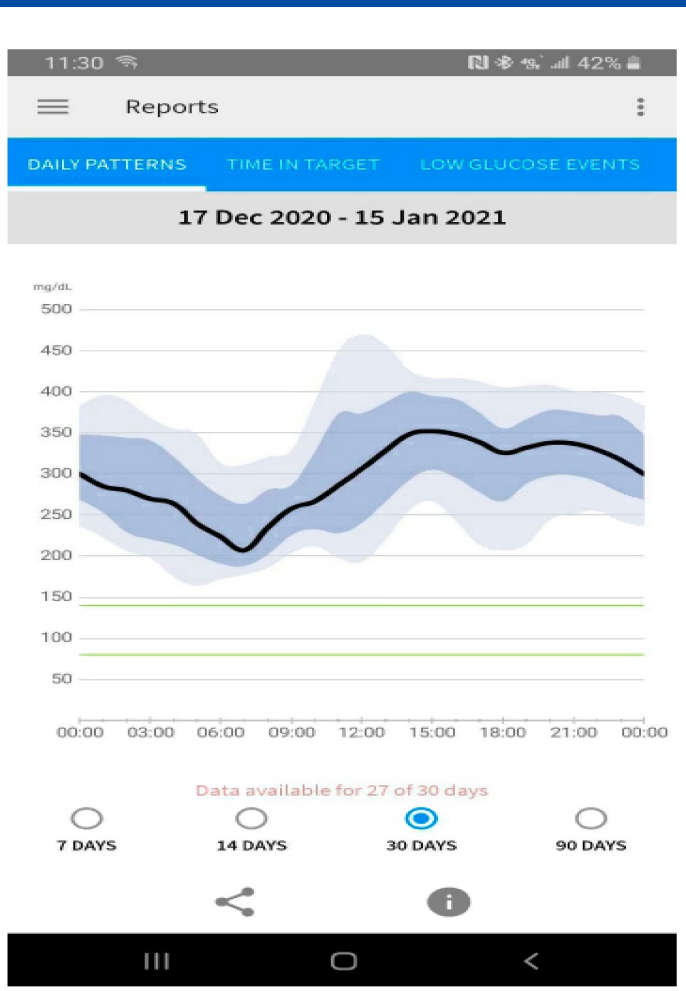
DM Rx:

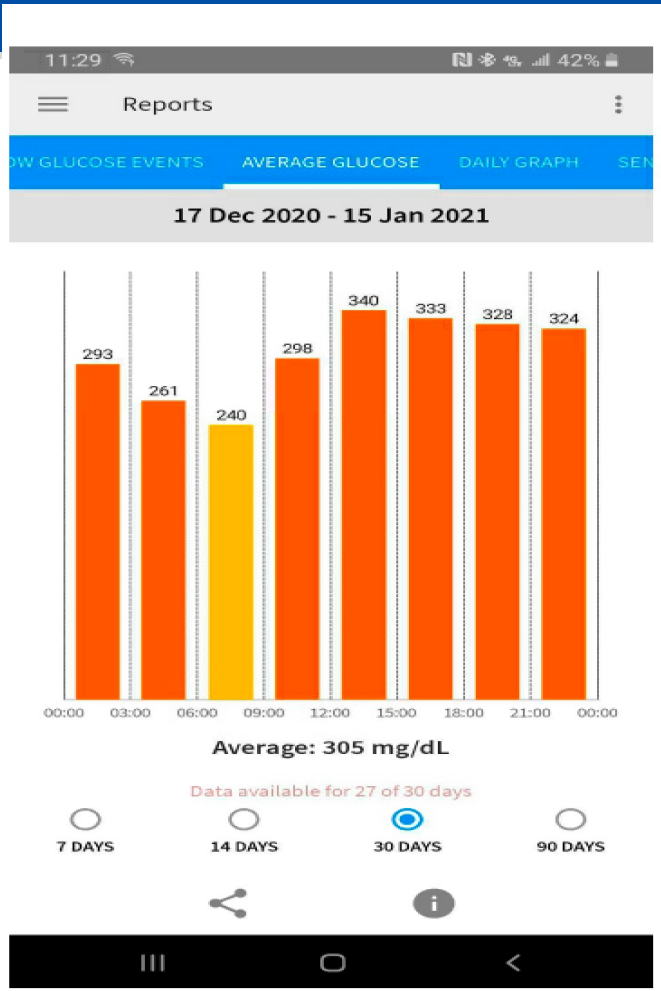
- Metformin XR 2000mg daily
- Insulin Glargine 60 units in PM (basal)
- Insulin Lispro 5 units with meals PLUS BG correction by Sliding Scale
  - Sliding Scale: 2 units/50 > 100

Glucose Monitoring:

- Using rtCGM

Case 3 – rtCGM Data period: 12-17-20 to 1-15-2021





1. AGP: 100% TAR with no hypos
2. Pre-meal averages all above goal
3. Daily average: 305

Case 3 – Assessment/Plan

Component	1/14/2021	10/26/2020	9/02/2020
A1C, POC 4.0 - 6.0 %	11.1	10.5	9.9

Assessment:

T2DM – uncontrolled on BBC & MTF

- A1c: 11.1% compared to last of 10.5%
- AGP: 100% TAR with no hypos
- Pre-meal averages: all above goal
- Elevated CVD Risk: DM, HTN, HLD, FHx CAD, Obesity.

Plan:

- **T2DM:**
  1. Start GLP-1 – Semaglutide
     - 0.25mg weekly x 4 weeks then increase to 0.5 & maintain until f/u
     - Call the for any persistent, intolerable GI side effects
  2. Continue Insulin Glargine 60 units in PM
     - If FBG > 150 mg/dL for 1 week, then increase Glargine by 1 unit weekly
  3. Continue pre-meal Bolus & Correction Insulin Lispro at current dosing
  4. Continue Metformin
  5. Initiate individualized weight loss considerations, diet & activity plan as directed
  6. Continue using rtCGM
- **RTC in 3 months**

BBC: Basal-Bolus-Correction insulin; MTF: Metformin

Case 3 – 8 Month Follow-up: 9-22-21 to 10-5-21

GLUCOSE STATISTICS AND TARGETS

September 22, 2021 - October 5, 2021	**14 Days**
% Time CGM is Active	**57%**

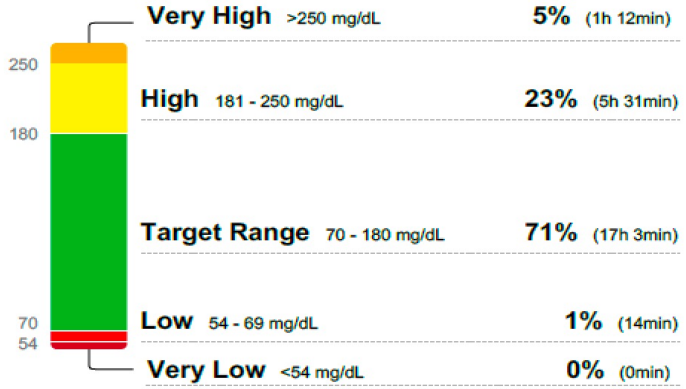
Ranges And Targets For	Type 1 or Type 2 Diabetes
Glucose Ranges	**Targets** % of Readings (Time/Day)
Target Range 70-180 mg/dL	Greater than 70% (16h 48min)
Below 70 mg/dL	Less than 4% (58min)
Below 54 mg/dL	Less than 1% (14min)
Above 180 mg/dL	Less than 25% (6h)
Above 250 mg/dL	Less than 5% (1h 12min)

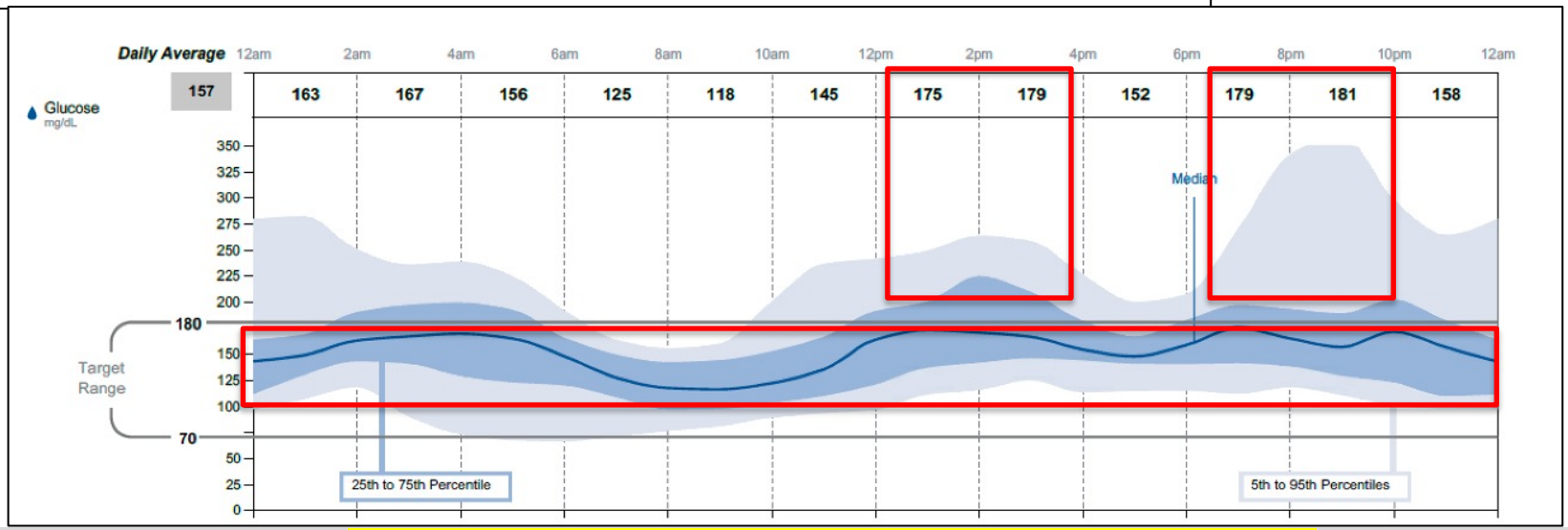
Each 5% increase in time in range (70-180 mg/dL) is clinically beneficial.

Average Glucose	**157** mg/dL
Glucose Management Indicator (GMI)	**7.1%**
Glucose Variability	**33.2%**

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

TIME IN RANGES





1. **AGP: 71% TIR & 28% TAR with 1% hypos w/o obvious pattern**
2. **Median daily BG average near upper limits of target BG**
3. **Some glucose variability at HS but o/w pre-meal BG averages improved.**

Case 3 – 8 Month Follow-up

Component	11/16/2021	1/14/2021
A1C, POC 4.0 - 6.0 %	7.8	11.1

Assessment:

T2DM – uncontrolled but significantly improved trends on GLP-1, B-B-C insulin & MTF

- A1c: 7.8% compared to last of 11.1%
- AGP: 71% TIR & 28% TAR with no freq/sig. hypos
- Some glucose variability at HS but o/w pre-meal BG averages improved
- Median daily BG average near upper limits of target BG; would benefit from GLP-1 titration.

Plan:

- **T2DM:**
  1. Increase Semaglutide to 1.0mg weekly
     - Call the for any persistent, intolerable GI side effects
  2. Reduce Insulin Glargine from 64 to 58 units to reduce risk of AM hypo
  3. Continue Metformin, Pioglitazone
  4. Continue using isCGM & 4-6x daily
  5. Continue with individualized weight loss considerations & activity plan as directed
- **RTC in 3 months**

BBC: Basal-Bolus-Correction insulin; MTF: Metformin

Case 4

- **42 yo presents for T2DM follow-up**
- Did not bring a BG log or meter → **No AGP**
- Reports the following perceived BG readings for "several months":
  - FBG: 110-120's range
  - PM pre-meal: 120-150's range
- **DM Rx:**
  - Metformin XL 1000mg BID
  - Insulin Glargine 30 units at HS
  - Insulin Lispro 8 units with meals
- **Data:** A1c: 9.2%

HbA1c & Estimated Average BG
5% – 90 mg/dL
6% - 120 mg/dL
7% - 150 mg/dL
8% - 180 mg/dL
9% - 210 mg/dL
10% - 240 mg/dL
11% - 270 mg/dL
12% - 300 mg/dL
13% - 330 mg/dL
14% - 360 mg/dL

- **What's the best next step for patient's diabetes management?**

FBG: Fasting blood glucose; AGP: Ambulatory Glucose Profile

Case 4 – Poll Everywhere Question

What's the best next step for patient's diabetes management?

A. Increase insulin glargine by 20%
B. Increase insulin lispro with meals by 20%
C. Recommend the patient wear a professional CGM for 1 week
D. Continue the same diabetes regimen as patient is likely non-adherent

- **DM Rx:**
  - Metformin XL 1000mg BID
  - Insulin Glargine 30 units at HS
  - Insulin Lispro 8 units with meals

Case 4 – Poll Everywhere Question

What's the best next step for patient's diabetes management?

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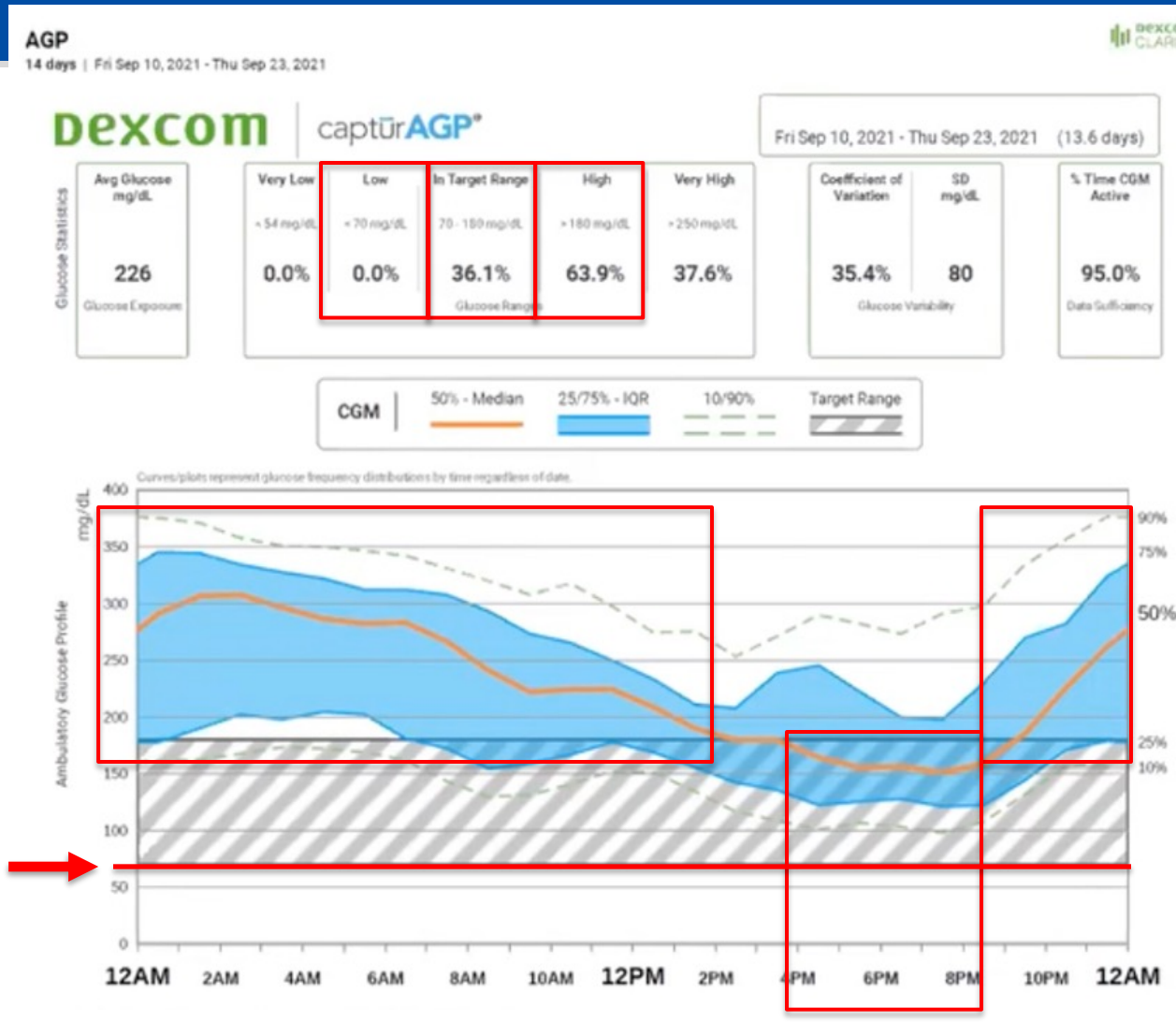
D. Continue the same diabetes regimen as patient is likely non-adherent

- **DM Rx:**
  - Metformin XL 1000mg BID
  - Insulin Glargine 30 units at HS
  - Insulin Lispro 8 units with meals

Case 4 -Patient returns to review Professional CGM results



AGP Assessment:

1. TBR: 0%
2. TIR: 36%
3. TAR: 64%
4. Avg BG: 226
5. SD: 80
6. CV: 35.4%

Patterns Assessment:

1. No hypoglycemia
2. TIR/Low BGs: ~100s 4-8pm
3. Significant PP hyperglycemia from 10pm to 2pm next day
4. BGs > goal for most of day

Plan:

1. **Increase PM meal insulin lispro by 20% (to 10 units)**
2. **Increase insulin glargine by 10% (to 33 units)**

PP: Post prandial SD: Standard deviation; CV: Coefficient of Variation

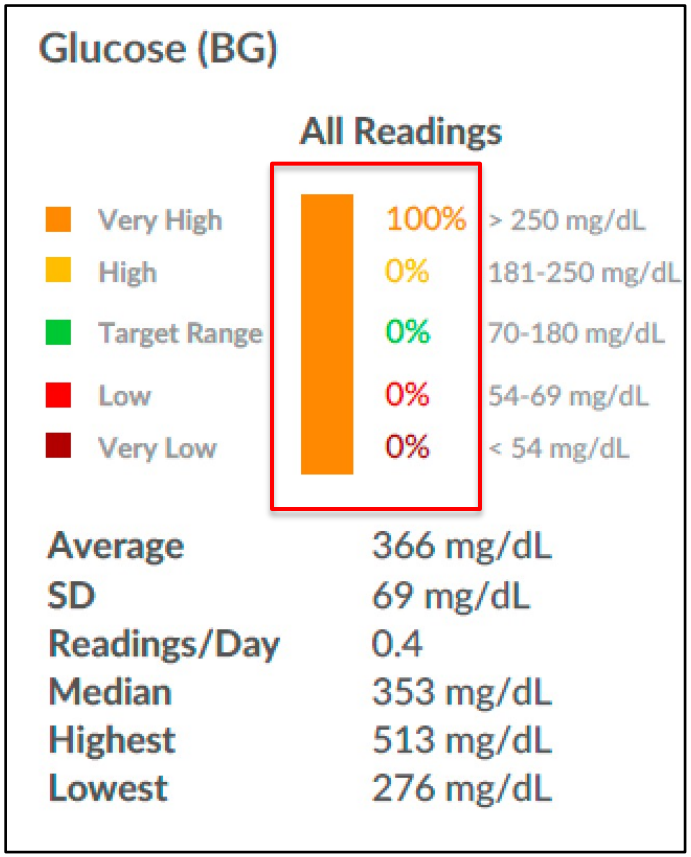
Case 5

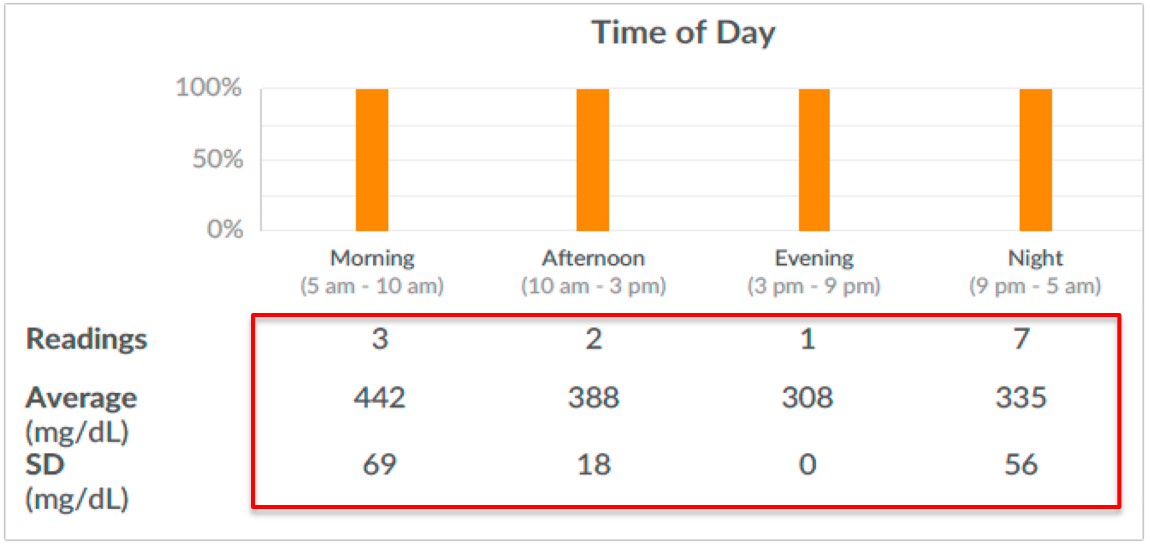
- 58 yo with a PMH of T2DM & Overweight (BMI 26) presents for f/u & complains of persistent symptomatic hyperglycemia.
- **DM Meds:**
  - Metformin XR 500mg twice daily before meals
- **Data:** BG 395 & Udip NEG for ketones
- **POC A1c & trends:**

Lab Results

Component	Value	Date
HGBA1C	13.8 (H)	11/28/2021
HGBA1C	6.1	09/13/2021
HGBA1C	6.2	03/15/2021
HGBA1C	5.8	09/14/2020

Case 5 - Persistent symptomatic hyperglycemia





Glycemia Report:

Date of Interpretation:	12/3/2021
Data period:	11/20/21 - 12/3/2021
Readings:	13
Mean BG (mg/dL):	366
Range BG mg/dL):	276-513
% Hyperglycemia (>180):	**100%**
% at Target (70-180):	0%
% Hypoglycemia (<70):	0%

Case 2 – A/P: Above goal A1c & AGP

Assessment:

- **Uncontrolled T2DM**
- **A1c at diagnosis 7.1% | A1c range 5.8-7.1% last 3+ yrs on MTF 500mg BID**
- **A1c now 13.8% & AGP from BG meter shows 100% hyperglycemia**
  - Patient changed MTF "by mistake" to 500mg DAILY
- **Increased suspicion for possible etiologies:**
  - "The patient is non-adherent."
  - Developing insulinopenia given FHx of brother with T1DM? Converting to T1DM?
  - Increased insulin resistance with glucose toxicity with inadvertent med dosing lapse?
- **Plan:**
  - Add Lantus insulin 12 units daily (0.2 x kg daily) & increase MTF XR to 1000mg BID
  - Check C-pep, GAD Ab, IA-2 Ab, Insulin AutoAb, Zinc transporter Ab
  - Check BG 4x daily
  - Send BG readings via MyChart & for further Lantus dose titrations prn
  - Consider addition of GLP-1 once A1c < 10% if indicated
  - Follow-up with PA Weber in 4-6 weeks

MTF - Metformin

Case 5 – Telehealth 1 Month Follow-up

Data:

- **A1c now 11.3% (10 days ago)**
- **AGP: 90% TIR & 10% TAR (For last 2 weeks)**
  - Rx: MTF XR 1000mg 2x daily & Lantus 20 units daily (up-titrated between visits)
- **Labs:**
  - NL range C-peptide & NEG GAD Ab, IA-2 Ab, Insulin AutoAb, Zinc transporter Ab

Assessment:

- **Uncontrolled T2DM with improving A1c trends & TIR to 90% w/o hypos**
  - **Etiology?: Glucose toxicity & related insulin resistance in setting of med dosing lapse**

Plan:

- **Continue Lantus daily & MTF XR 1000mg BID**
- **Consider injectable or oral GLP-1 with transition off insulin in future**
- **Continue BG monitoring & send via MyChart in 3 weeks**
- **Follow-up with PA Weber in 6 weeks**

Case 6

- 62-year-old with T2DM (‘20), NICVD & BMI of 38. Complains she’s only lost a few pounds after multiple unsuccessful attempts at lifestyle changes including stricter BG monitoring, activity & diet changes.

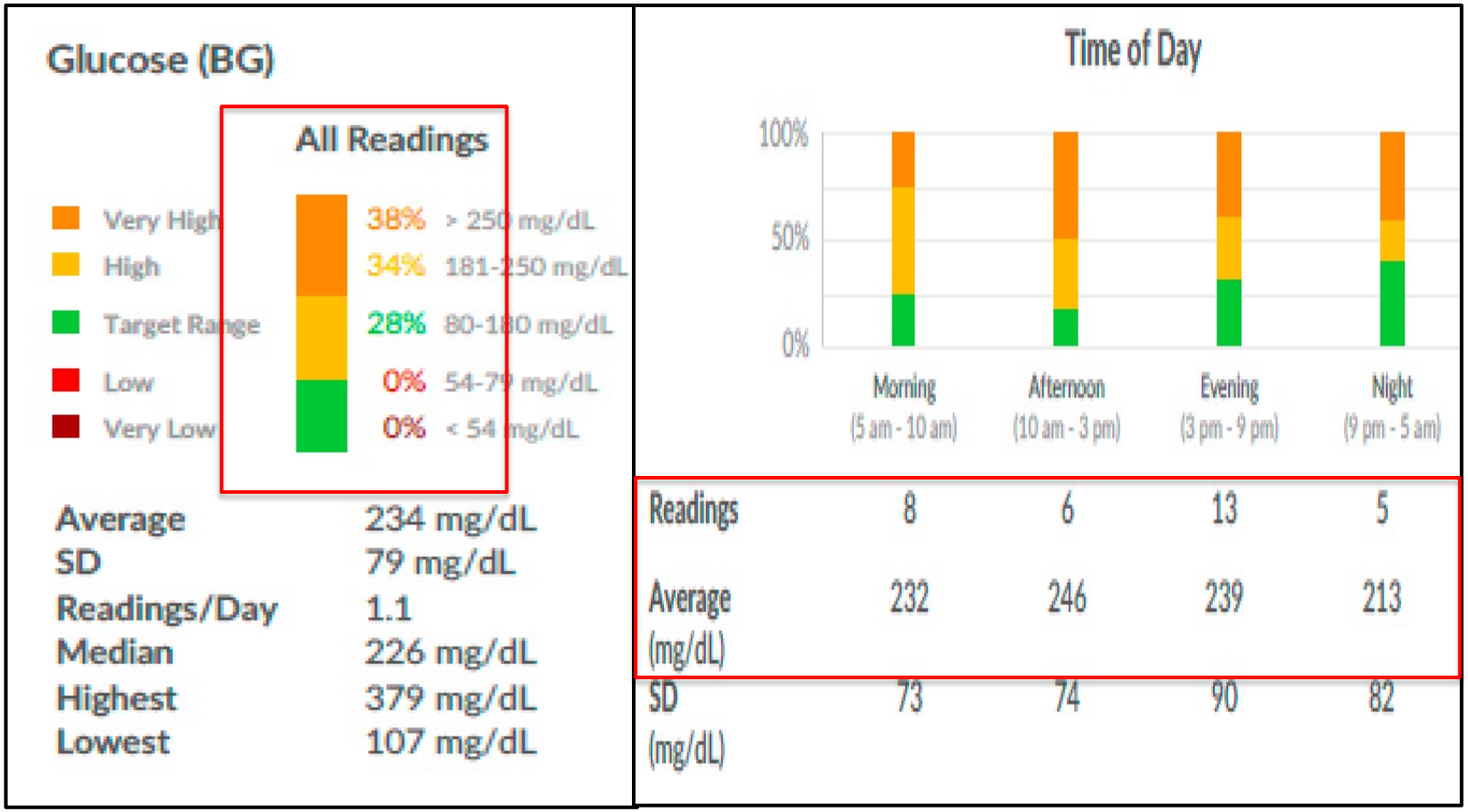
- **DM Meds:**
  - Metformin XR 2000mg twice daily before meals

- **Data:** A1c trends (A1c drawn ~1 month before visit; Goal of A1c 6-7%:

Lab Results

Component	Value	Date
HGBA1C	7.8	09/15/2021
HGBA1C	7.9	03/10/2021
HGBA1C	7.3	09/02/2020
HGBA1C	7.7 (H)	07/10/2020
HGBA1C	8.3 (H)	04/30/2020
HGBA1C	12.0 (H)	02/10/2020

Case 6 - AGP



AGP: Ambulatory Glucose Profile

Case 6 – A/P: Above goal A1c, AGP & weight

Assessment:

- **Uncontrolled T2DM with CVD hx & overweight on MTF 1000mg BID**
  - Above goal A1c 7.8% (goal 6-7%)
  - Above goal AGP: 28% TIR & 72% TAR
- **Weight above goal - BMI of 38 & motivated for lifestyle changes**
  - Blaming herself for failing unrealistic goals
  - Not giving herself credit for small successes
  - Assess "Lifestyle VS" & employ "SMART" goals
- **Plan:**
  - **Lifestyle Med Plan:**
    - Download Pedometer to smart phone
    - Activity Rx given: 2000 steps/day x 1 mo & aim to increase to 10K steps/day
  - **Add GLP-1 → Ozempic 0.25 x 4 wks /0.5 x 4 wks/1 mg weekly**
  - **Continue MTF XR 1000mg BID**
  - **Check BG 2x daily & send via MyChart BG**
  - **Follow-up with PA Weber in 3 months**

Case 6 - 3 Month Follow-up

DM Meds:

- Metformin XR 2000mg twice daily before meals
- Ozempic (Semaglutide) 0.5mg sc weekly

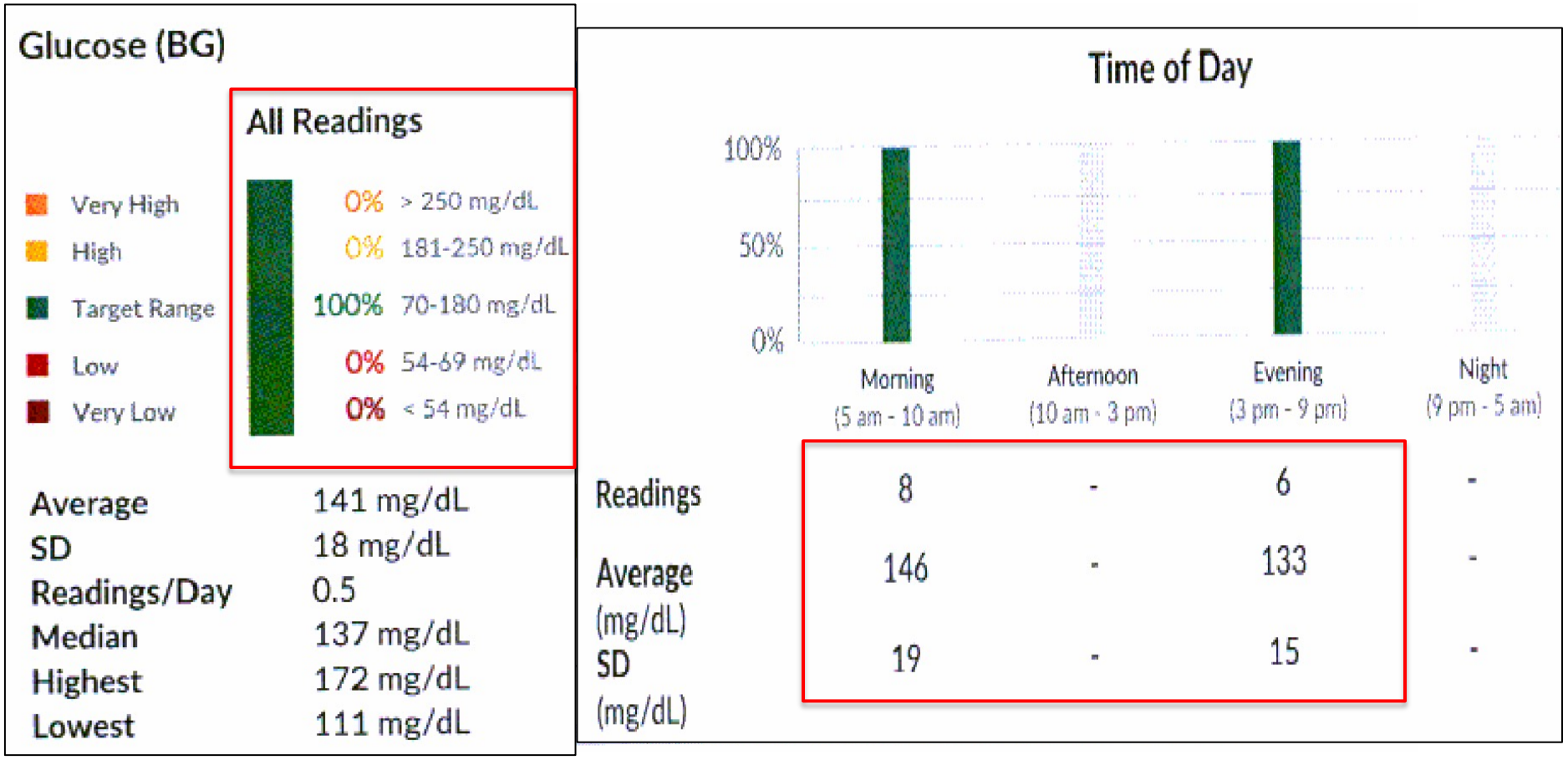
Lifestyle Vitals:

- Using smartphone pedometer & averaging 5-7 K steps/day
- Maintaining small portion sizes & healthier nutrient balance

Data:

- Wt loss 7lbs
- A1c 6.8%
- **AGP?**

Case 6 – AGP: 3 Month Follow-up



AGP: Ambulatory Glucose Profile

Case 6 - 3 Month Follow-up A/P

DM Meds:

- Metformin XR 2000mg twice daily before meals
- Ozempic (Semaglutide) 0.5mg sc weekly

Lifestyle Vitals:

- Using smartphone pedometer & averaging 5-7 K steps/day
- Maintaining small portion sizes & healthier nutrient balance

Data:

- Wt loss 7lbs
- A1c 6.8% & AGP 100% TIR; SMBG 2x/day

Assessment: Controlled T2DM & 7lb Weight loss

Plan:

- **Lifestyle Plan:** Reassess for confidence in maintaining
- **Consider maintenance vs increase of Ozempic for wt loss benefit?**
- **Continue MTF XR 1000g BID**
- **Check BG 2x daily 2-3x/week for surveillance**
- **Follow-up in 3 months**

Case 7

45 yo with Type 1 DM on CSII pump admitted for CAP

- Insulin pump "suspended" at time of admission as a "matter of routine"
- Patient placed on BBC insulin based on TDD insulin on pump.
- BG levels elevated & patient complained about multiple daily injections.
- Team agreed to allow resumption of insulin pump.
- BGs elevated further & thought due to illness & lack of activity.
- Patient's basal insulin increased & with same bolus sensitivities.
- BG's remained elevated & medical team consulted Endocrine.

What is the most likely reason for the persistently elevated BGs?

A. Higher insulin & lower insulin sensitivity due to illness
B. Insulin lack due to problem with the pump or infusion set
C. Dietary indiscretions
D. Stress of illness

CSII: Continuous subcutaneous insulin infusion

Case 7 – Follow-up

Case 7

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- Patient placed on BBC insulin based on TDD insulin on pump.
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C. Dietary indiscretions
D. Stress of illness

CSII: Continuous subcutaneous insulin infusion

Case 8

38 yo with a PMH of T1DM presents for follow-up:

DM Rx:

- Tresiba 7U at bedtime
- Novolog 0.5-3.5 U TID meals with In-Pen)
  - In-Pen download show 4-8 boluses/day (meal/corrections)

In-Pen Settings:

- **ISF:** (mealtime)
  - 1:60
- **ICR:**
  - 1:12
- **Target BG:**
  - 90
- **Insulin Action:**
  - 3hrs

ISF: Insulin sensitivity factor; ICR: Insulin:Carb ratio

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In-Pen Settings:

- **ISF:** (mealtime)
  - 1:60
- **ICR:**
  - 1:12
- **Target BG:**
  - 90
- **Insulin Action:**
  - 3hrs

Component	10/28/2021
Hemoglobin A1c *4.0 - 5.6 %*	5.9 (H)
Estimated Average Glucose *mg/dL*	123

ISF: Insulin sensitivity factor; ICR: Insulin:Carb ratio

Case 8

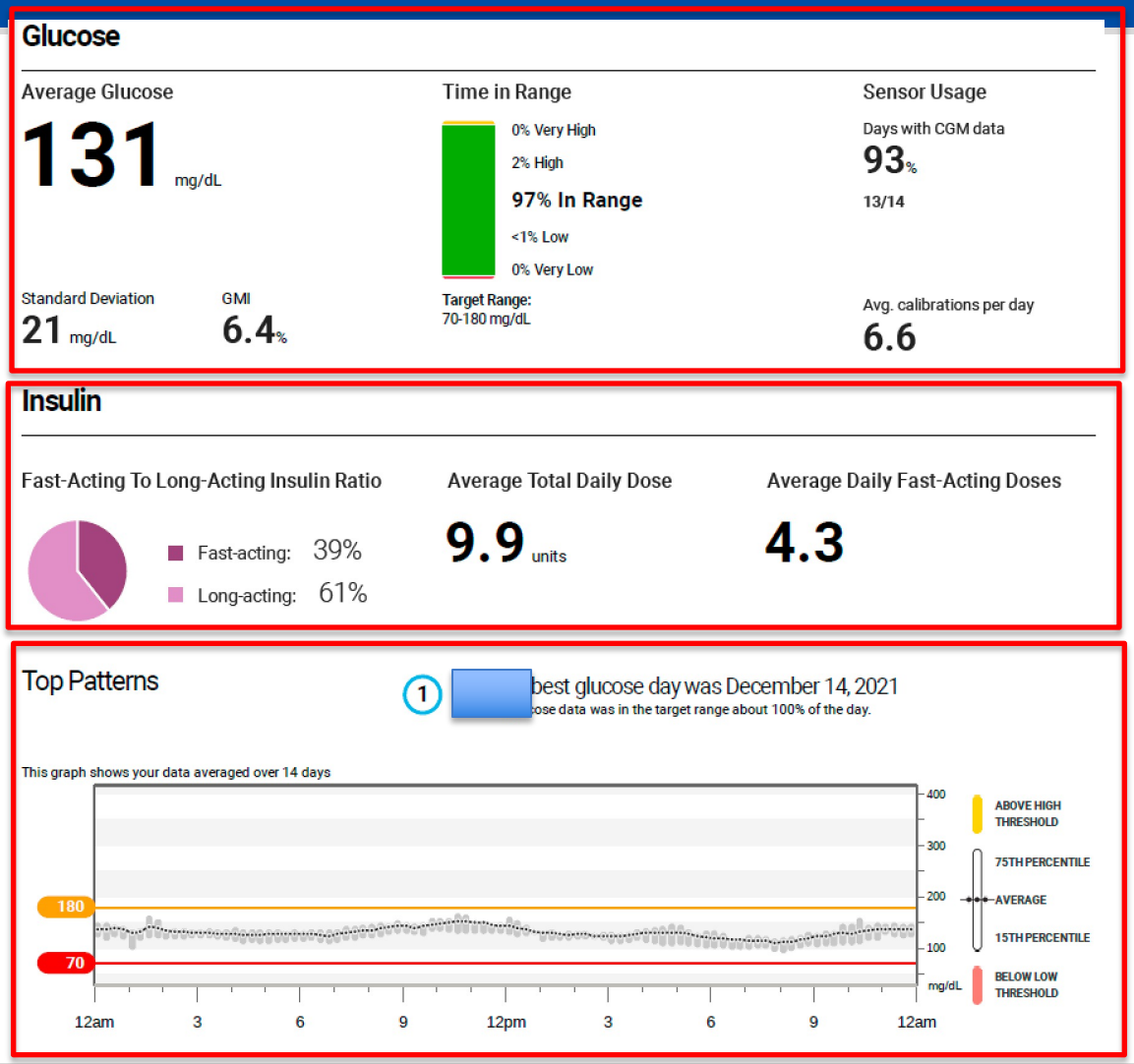
38 yo with a PMH of T1DM presents for follow-up:

DM Rx:

-Tresiba 7U at bedtime

-Novolog 0.5-3.5 U TID meals

- **In-Pen**



Case 8

38 yoF with a PMH of T1DM presents for follow-up:

DM Rx:

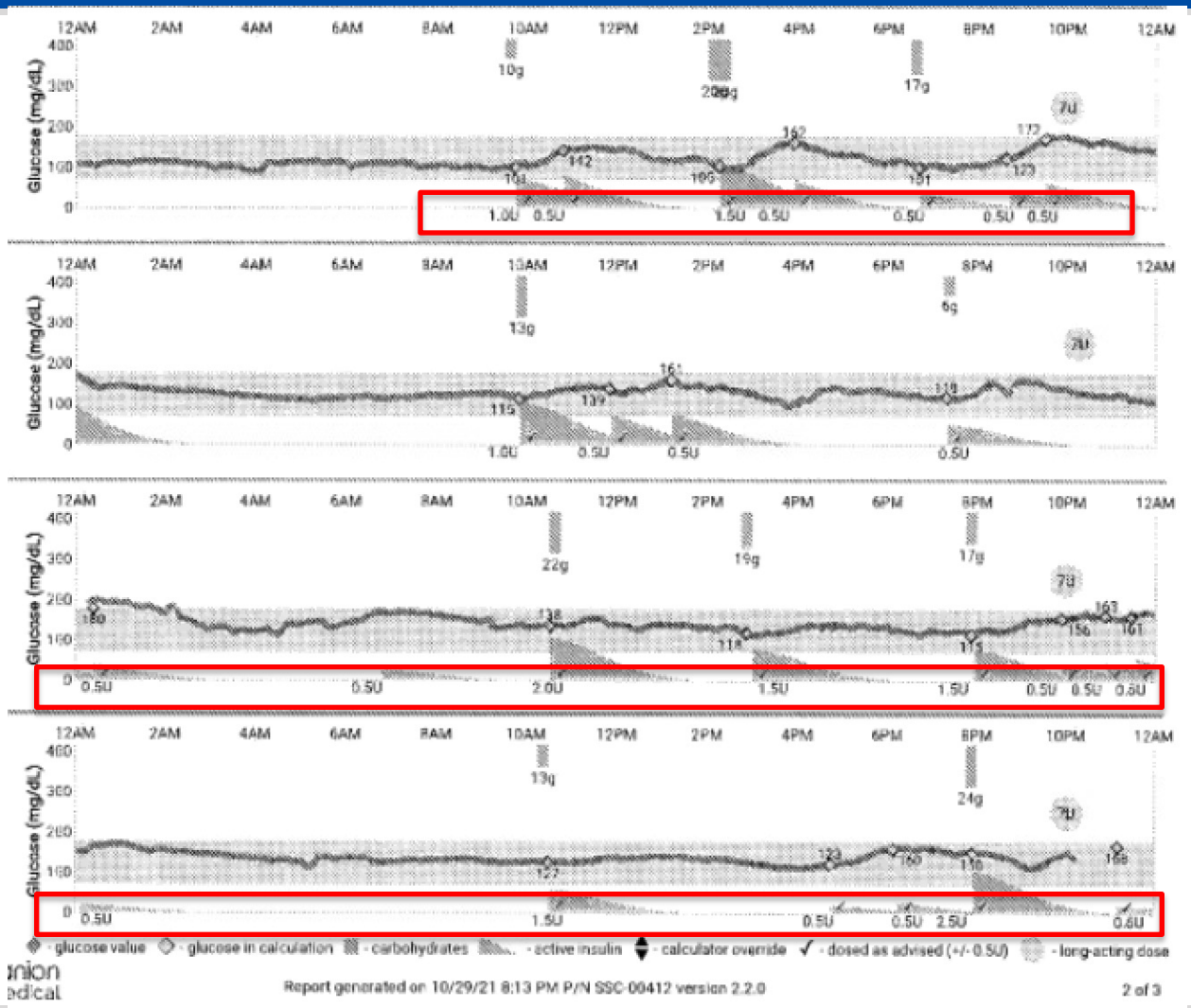
- Tresiba 7U at bedtime
- Novolog 0.5-3.5 U TID meals with In-Pen)

Trends/Patterns?:

- **In-Pen download shows 4-8 boluses/day**
- **Meals & corrections**
- **Overly aggressive?**

Plan:

- **Give permission to relax**
- **Try to avoid minute to minute surveillance**



Case 9

26 yo with Type 1 DM presents to clinic:

Complains of a warm & itchy rash at infusion site x 1 week. The infusion set was only in for 36 hours "as usual". Area started as an itchy area followed by a red, tender rash. She saw some "pus" 3 days ago & now feels a "painful lump" under the skin. She called in last week & was advised to wash it with soap & water daily & it would be fine in 3 days, but "it's still there".

On exam, you examine the patient & observe this:

What is most likely reason for persistent rash?

A. Allergic reaction to infusion set adhesive

B. Contact dermatitis

C. Dermatographia

D. Probable cellulitis with possible early abscess

Case 9

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Complains of a warm & itchy rash at infusion site x 1 week. The infusion set was only in for 36 hours "as usual". Area started as an itchy area followed by a red, tender rash. She saw some "pus" 3 days ago & now feels a "painful lump" under the skin. She called in last week & was advised to wash it with soap & water daily & it would be fine in 3 days, but "it's still there".

On exam, you examine the patient & observe this:

What is most likely reason for persistent rash?

A. Allergic reaction to infusion set adhesive

B. Contact dermatitis

C. Dermatographia

D. Probable cellulitis with possible early abscess

SmartPhrases – Glycemia Reports – BG Meter

~~SMBG:~~ → BGM*

-Uses BG meter | Uses Libre CGM | Uses Guardian Link or Dexcom CGM

-Checks BG | Scans 2-4x/day qAC AM & PM & when feeling hypos

-Hypos: 3-4x/wk & mostly in late AM; some to low 50's

	Pre-Meal BG (mg/dL)	2hr PPG (mg/dL)
Breakfast	xx	
Lunch	xx	
Supper	xx	
Bedtime	xx	

*Summary of Revisions: *Standards of Medical Care in Diabetes - 2022. Diabetes Care* 2022;45(Suppl. 1):S4

SmartPhrases: Glycemia Reports – BG or CGM Downloads

SMBG:

-Checks BG 2-3x/day before AM & PM meals & when feeling hypos

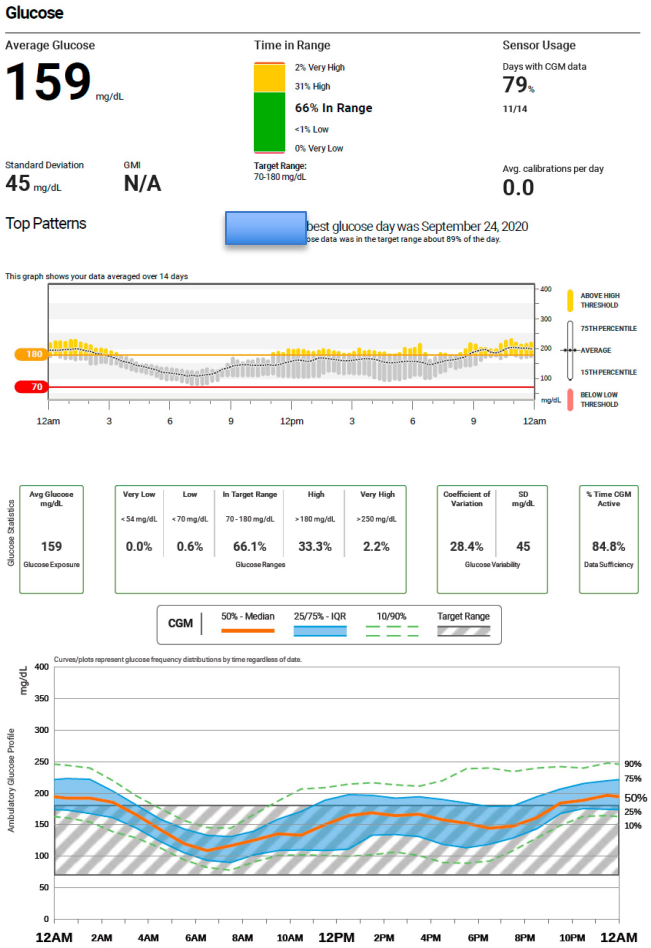
-Hypos: 3-4x/wk & mostly in late AM; some to low 50's

<u>Glycemia Data Report:</u>

Date of Interpretation:	1/3/2022	
Data period:	**xx**-1/3/2022	
Readings:	xx	
Mean BG (mg/dL):	xx	
Range BG mg/dL):	xx-xx	**Previous AGP:**
% Hyperglycemia (>180):	xx	40%
% at Target (70-180):	xx	54%
% Hypoglycemia (<70):	xx	6%

Average BG (mg/dL) values by meals:

AC Brkfst (AM Fasting):	xx
AC Lunch:	xx
AC Dinner:	xx
HS:	xx



SmartPhrases –Diabetes Health Maintenance

- **DM HM**
  - **CVD Risk Reduction:** No PMH of CAD, PVD or CVA
    - **HTN:** BP at goal; on ARB & HCTZ; no routine exercise; activity plan as directed.
    - **HLD:** FLP UTD & LDL/Tg above goals; increase statin from mod to high intensity
  - **Neph/CKD Risk Reduction**: Cr/GFR: 0.93/110; UACR: UTD & POS. On ACEi.
    - Check UACR at next visit if glycemia improved
  - **Ophthal:** Denies DPR; no complaints/changes in vision. Exam: UTD (Nov '21)
    - Ophthal f/u in 2022
  - **Pod:** No PMH Sensory neuropathy; no complaints; Exam: NL MF screen (Jan '22)
    - Repeat MF screen annually.

CGM Prescribing

- FREESTYLE LIBRE 14 DAY READER
- FREESTYLE LIBRE 14 DAY SENSOR KIT

- GUARDIAN CONNECT TRANSMITTER DEVICE
- GUARDIAN LINK 3 TRANSMITTER DEVICE
- GUARDIAN RT TEST PLUG DEVICE
- GUARDIAN SENSOR 3 DEVICE

- DEXCOM G6 TRANSMITTER DEVICE
- DEXCOM G6 SENSOR DEVICE
- DEXCOM G6 RECEIVER MISC

CGM Billing

Common Billing Codes for Personal & Professional CGM Visits & Services[1]

CPT Code	Type of Service	Provider	Frequency	Encounter Type
95249	Personal CGM (Initial startup & training)	RN, PharmD, CDCES or MA (if within scope) under the supervision of a physician, advanced practitioner, or hospital outpatient department	Once during time the patient owns the device or if transitioning to new device	Face to face visit
95250	Professional CGM (Startup, training, application, removal & printout)	RN, PharmD, CDCES or MA (if within scope) under the supervision of a physician, advanced practitioner, or hospital outpatient department	Maximum once per month	Face to face visit
95251	CGM data interpretation	Physician, NP, PA or CNS	Monthly*	Non-face to face visit
-25 modifier	Separate identifiable service	Physician, NP, PA or CNS	With office visits	Face to face visit

*Time intervals for data analysis reimbursement may vary by payer organization

[1]Miller EM. Using Continuous Glucose Monitoring in Clinical Practice. *Clin Diabetes*. 2020;38(5):429-438. doi:10.2337/cd20-0043

5 Tips for Diabetes Technology & Management

1. **Reducing hypoglycemia & increasing TIR are treatment priorities**
2. **Aim for "*Individual & Incremental*" changes in management**
3. **Glucose monitoring device selection – CGM is biggest bang for buck!**
4. **Confirm access to patients' CGM data & account**
5. **Aim to make CGM/pump alerts & alarms actionable**

TIR: Time in Range

Diabetes Tech & CGM Summary

Technology improves diabetes outcomes

Personal or Professional CGM systems are available

Change CGM sensors every 10-14 days

Use reader or scan sensor & link to a smartphone app

Monitor remotely & adjust medication without an office visit

Bill for CGM analysis & interpretation

- **Billing code: 95251**
- **Min. 72 hrs of CGM data**

Post-Session Questions

1. When evaluating a patient with diabetes, correcting hyperglycemia should take priority over eliminating hypoglycemia.

   A. True
   B. False

Post-Session Questions

2. A CGM can be considered in some capacity for which of the following persons with diabetes?

   A. Adolescent with T1D
   B. Adult male with T2D taking oral meds, considering insulin
   C. Pregnant female with T1D
   D. All of the above

Post-Session Questions

3. 65 y.o. with T2DM presents for routine follow-up. Patient is on basal & bolus insulin. Reports blood sugars have been running 250-300 mg/dL for the last few months. Did not bring in a glucose log or meter but denies hypoglycemia. Today's A1c is 6.5%.
   What is the next best step for management of this patient's diabetes?

   A. Order an intermittently scanned CGM to collect more BG data for next visit
   B. Increase bolus insulin & decrease basal insulin to prevent hypoglycemia
   C. Advise short-term use of pro-CGM & start process for obtaining personal CGM
   D. Continue current regimen as A1c shows good diabetes control

Pre-Session Questions

4. In order to get Medicare coverage for a Continuous Glucose Monitor that is FDA approved for making treatment decisions without fingerstick verification, a person must meet <u>all the following requirements except</u>:

   A. Be on an insulin pump or receiving at least 3 doses of insulin per day
   B. Be monitoring their blood glucose at least 4 times daily
   C. Require frequent insulin dose adjustments based on CGM test results
   D. Be seen by a provider for diabetes within 6 months of CGM Rx & must continue to be seen at least every 6 months to continue coverage

Contact Information

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