

Diabetes Technologies:

Integrating Guidance, Gadgets & Gizmos

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Disclosures

- **I have no relevant relationships with ineligible companies to disclose within the past 24 months.**
- **Moonlight as pancreas 24/7/365 x 33 years**

Patient Perspective  *Provider Perspective*

Pre-Session Questions

1. **When educating patients about differences between blood glucose monitoring (BGM) & continuous glucose monitoring (CGM), you will want to include all the following except:**
 - A. CGMs will provide > 4000 glucose readings in a 2-week period
 - B. CGM systems give the most accurate readings of glucose
 - C. BGM systems give the most accurate readings of glucose
 - D. BGM readings are ~5-10 minutes ahead of CGM readings

Pre-Session Questions

- 2. CGMs have shown which of the following effects in clinical trials regarding hypoglycemia?**
- A. CGMs had no effect on time spent in hypoglycemia
 - B. CGMs increased time spent in hypoglycemia
 - C. CGMs reduced minutes/day spent in hypoglycemia with use of first sensor
 - D. CGMs reduced minutes/day spent in hypoglycemia after 3 months of use

Pre-Session Questions

- 3. In order to get Medicare coverage for Continuous Glucose Monitors (CGM), patients must meet all following requirements except:**
- 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 results
 - D. Be seen by a diabetes provider within 6 months of CGM Rx & followed at least every 6 months to continue coverage

Session Objectives

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

- *Review the classification & diagnosis of the most common forms of diabetes*
- *Compare & contrast the spectrum of available blood glucose data collection options*
- *Review consensus guidelines for most appropriate use of glucose monitoring technologies*
- *Analyze & interpret glycemic trends using ambulatory glucose profiles*
- *Explore case-based scenarios within the diabetes spectrum to apply most appropriate technologies*

General Classification Categories for Diabetes

Type 1 diabetes

- Autoimmune β -cell destruction, usually leads to insulin deficiency, including latent autoimmune diabetes of adulthood (LADA) **~5%**

Type 2 diabetes

- Progressive loss of β -cell mass & insulin secretion frequently on background of insulin resistance **90-95%**

Specific types of diabetes due to other causes

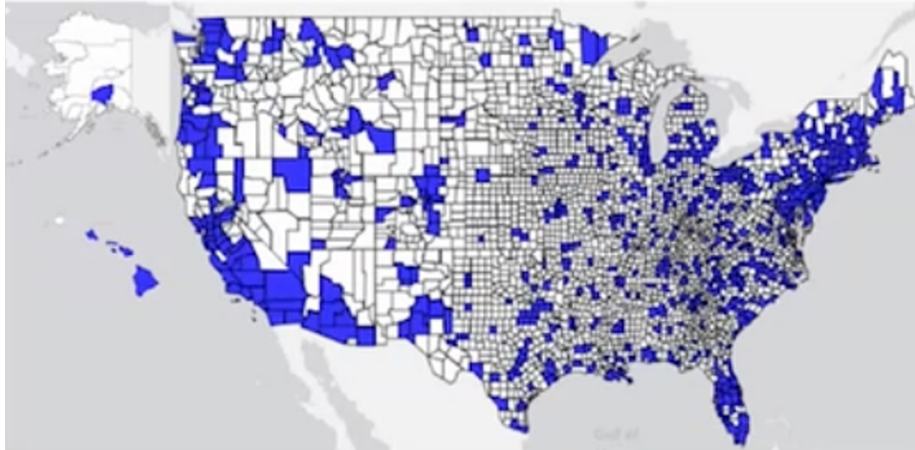
- Monogenic syndromes (neonatal & maturity-onset diabetes of young [MODY])
- Diseases of exocrine pancreas (cystic fibrosis & pancreatitis)
- Drug-induced diabetes (steroid-induced in patients with HIV s/p organ transplant) **<1%**

Gestational diabetes mellitus

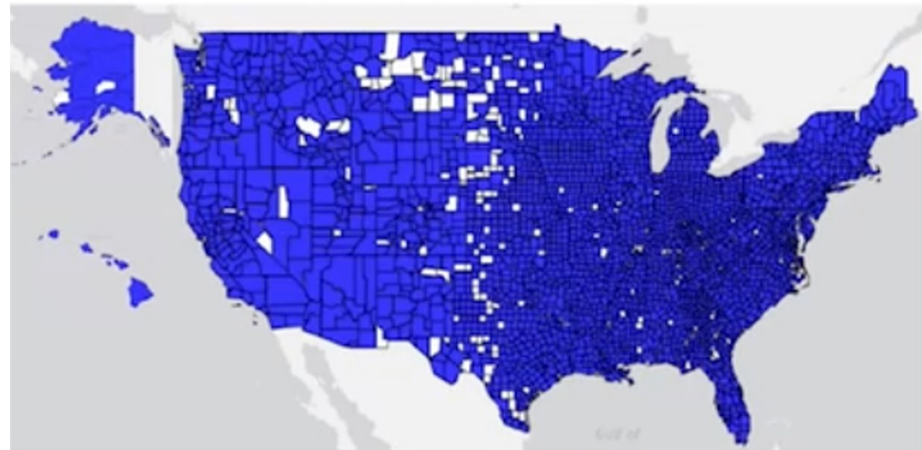
- Diagnosed in 2nd or 3rd trimester & not clearly overt diabetes prior to gestation **6-9%**

Distribution of Endocrinologists/Diabetologists & PCPs in US¹

US Counties with ≥ 1
Pediatric or Adult Endocrinologist/Diabetologist



US Counties with ≥ 1
Primary Care Provider



Total PCPs in the US²:

PAs: ~20%

NPs: ~30%

MD/DOs: ~50%

The Good News

- 90% of all pre-diabetes & diabetes management occurs within the primary care setting
- Early intervention can reduce incidence & prevalence rates of complications associated with the disorder, reduce cost & improve long-term quality of life

Comprehensive Goals Of Diabetes Management

- **Set glycemic targets to reduce microvascular & macrovascular CVD events**
 - A1C targets
 - **Ambulatory Glucose Profile (AGP) 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

History of Type 1 Diabetes Care & Tech Integration

Diabetes Technology

Last 100 years →

Insulin delivery device



Glucose monitoring device



Last 75 years →

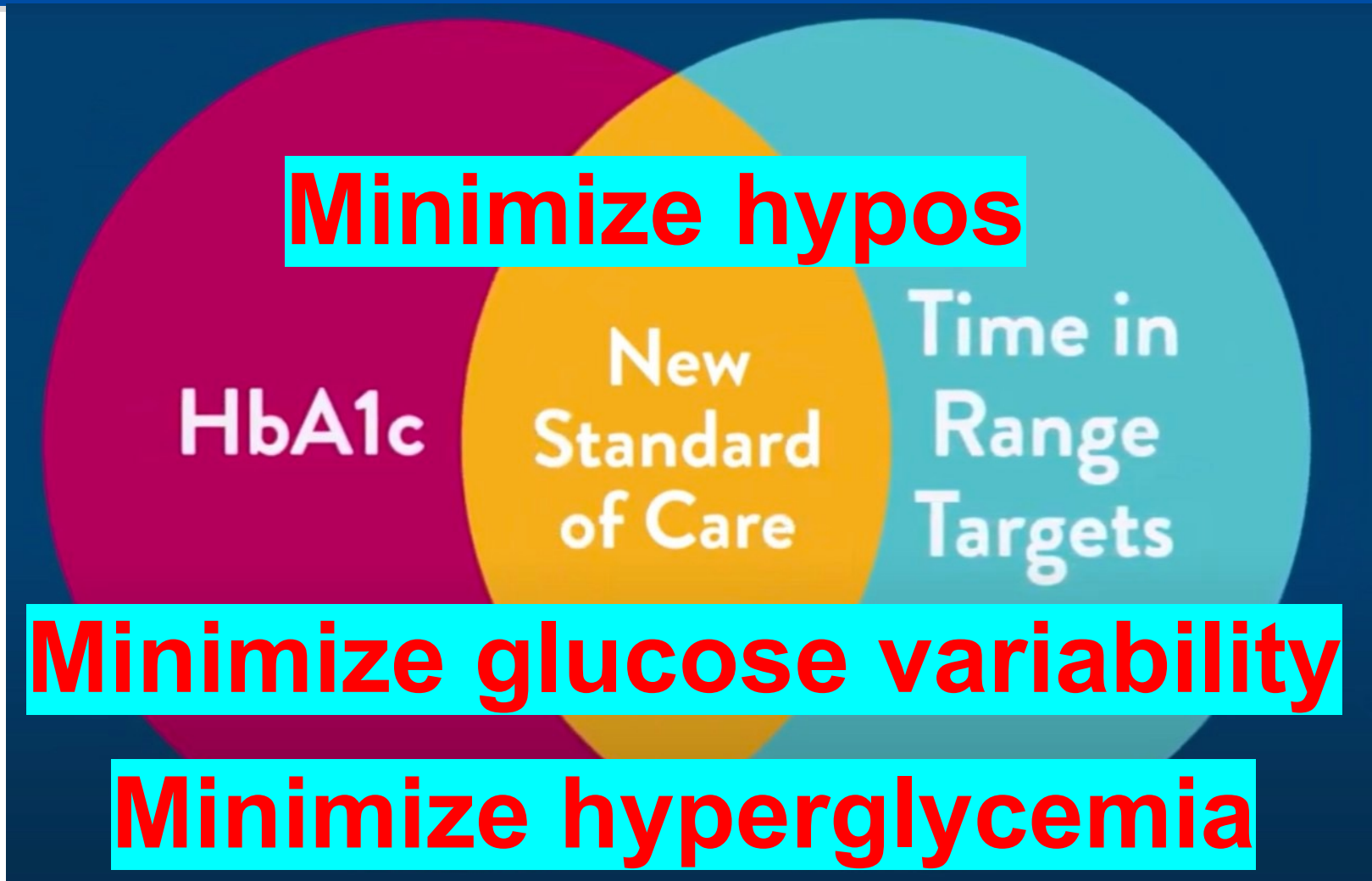
Today...

Merge



Future → ???

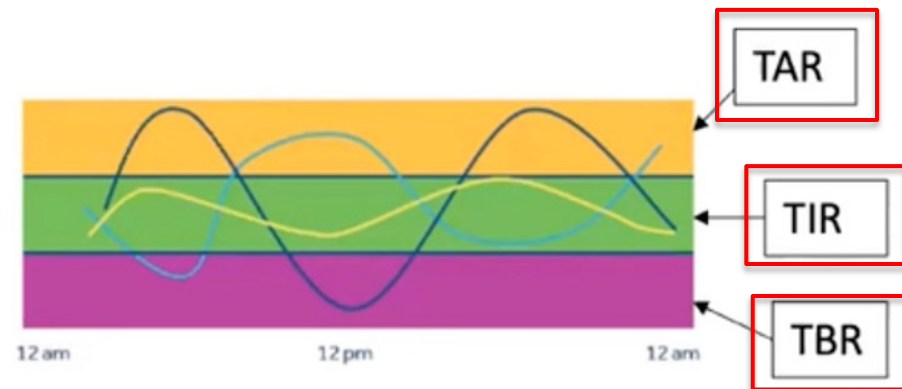
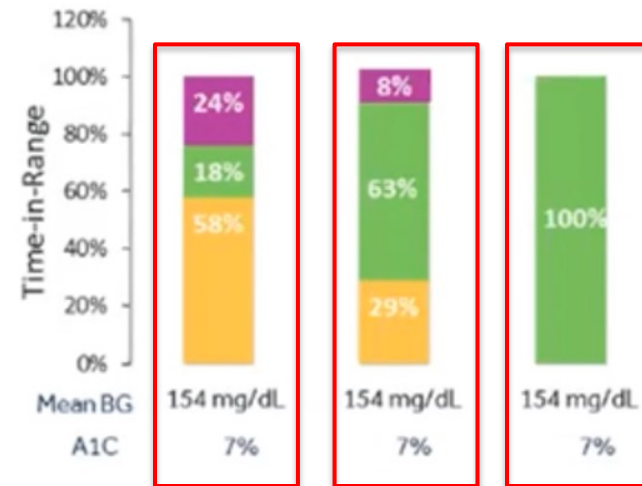
New Standards of Care



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

Ambulatory Glucose Profile →
7-14-30 day profile of BG trends



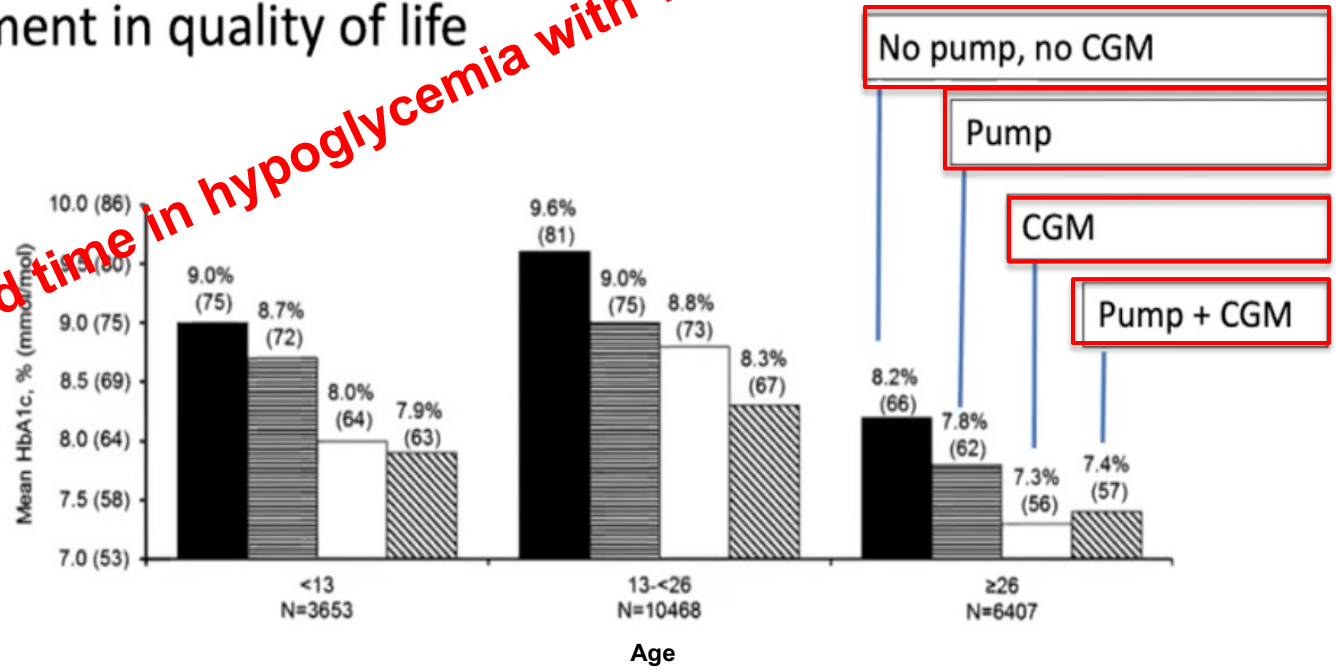
History of Continuous Glucose Monitoring (CGM)

- 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 Abbott FreeStyle Libre Pro Intermittently Scanned CGM
 - 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 Hybrid Closed Loop: Guardian CGM & Medtronic Minimed pump
- 2018 Hybrid Closed Loop: Dexcom CGM & Tandem t:slim pump

Why Use Technology?

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

CGMs reduced time in hypoglycemia with 1st SENSOR placement!



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

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

²ADA.Older Adults. *Diabetes Care*. 2022;45(Suppl.1):S195-S207.

³Battelino 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

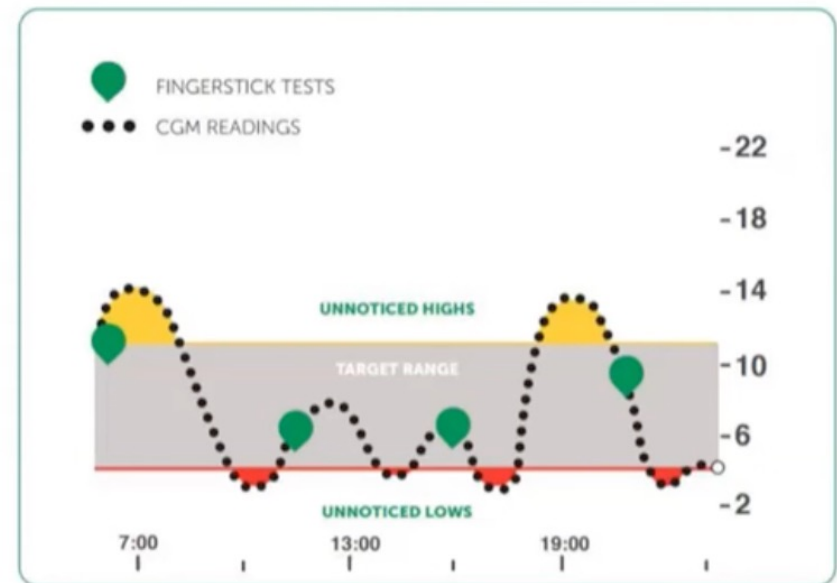


• PERSONAL DEVICES:

- Intermittently scanned or real-time



Ambulatory Glucose Profile



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

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.”

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.






¹Bolinder J et al. *Lancet*. 2016;388(10057):2254-2263.

²Davis TME et al. *Diabetes Technol Ther*. 2020;22(5):367-373.

³Haak T et al. *Diabetes Ther*. 2017;8(1):55-73.

⁴Yaron 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 loved ones)	Carelink

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



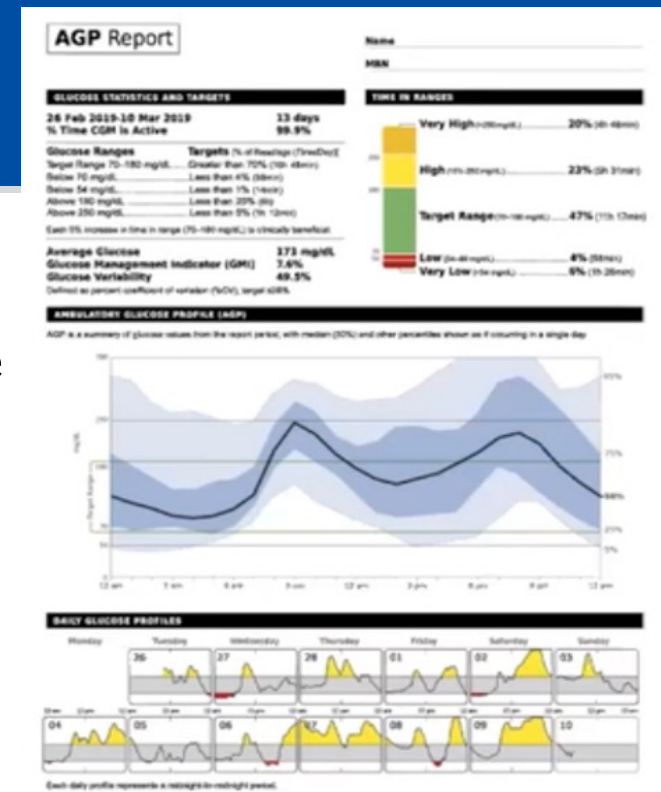
Real-time CGM (rtCGM)

Evidence

- Significant reductions in A1c from baseline
- Reductions in hypoglycemia
- T2DM: Reductions 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
- Patients still need to know how to perform SMBG to correlate lows



3 Common CGM systems



Abbott Freestyle Libre 2 System



Dexcom G6



Medtronic Guardian 3 CGM System

Good News! Medicare Coverage for Patients with T2DM & MDI therapy

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 look like & where device is secured.
- Check for Diabetes DME distributors in your area or call **1-800-MEDICARE** to determine cost.

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

Blood Glucose Meter Use | Serum vs ISF glucose



- An estimated **70%** of patients using diabetes medication purchased SMBG strips¹
- BG measures serum glucose (SG) & CGMs read interstitial fluid (ISF) glucose
- Serum glucose gives most accurate readings & are 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)

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%

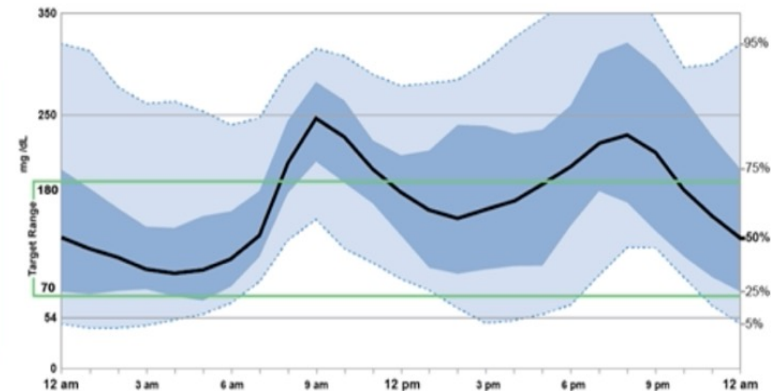
Defined as percent coefficient of variation (%CV); target \leq 36%

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 lack of motivation for BG meter use?

Clinical Approaches: Who needs a BG meter vs CGM?

- **Patients with BG meter & willing to check BG**
 - **Type 2 & at goal** → Surveillance 2-3x/wk FBG
- **Patients on MDI Rx: When to switch from BGM to CGM?**
 - **Patient safety** → To better predict & prevent hypos
 - **Not meeting targets** → To reduce hypos, improve TIR & glucose variability
 - **Patient interest & motivation** → Improve self-management & outcomes
- **Patients unwilling to check BG by finger sticks**
 - **Not meeting goals** → Prof CGM
 - **Wary or undecided patient** → Prof CGM or patients can order free trial
- **Patients without BG meters**
 - Perceived BG trends +/- A1c result?
 - Prof CGM → Trial for the unmotivated or less adherent patient

Systematic Approach to BGM/CGM reports

Minimize

- Hypoglycemia
- Glucose variability
- Hyperglycemia

Priorities

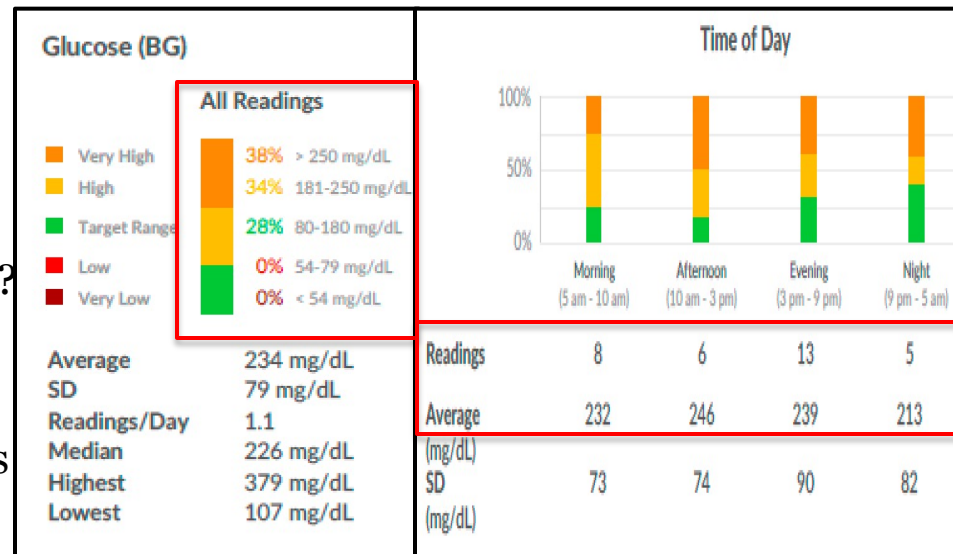
- Reduce hypoglycemia (TBR)
- Increase Time in Range (TIR)

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

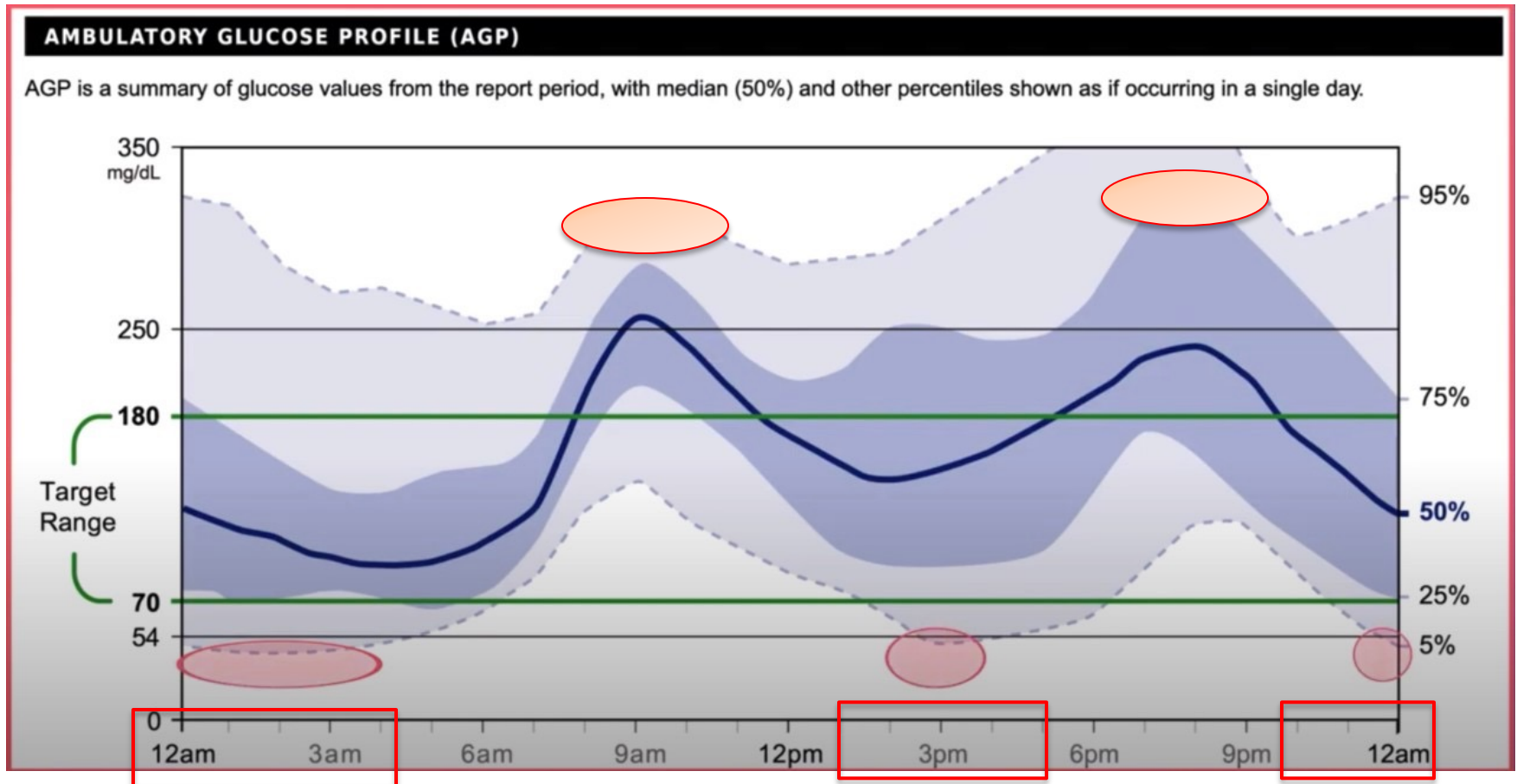
- **COMPILE DATA! Construct AGP from BG Meter or CGM data**

- % 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

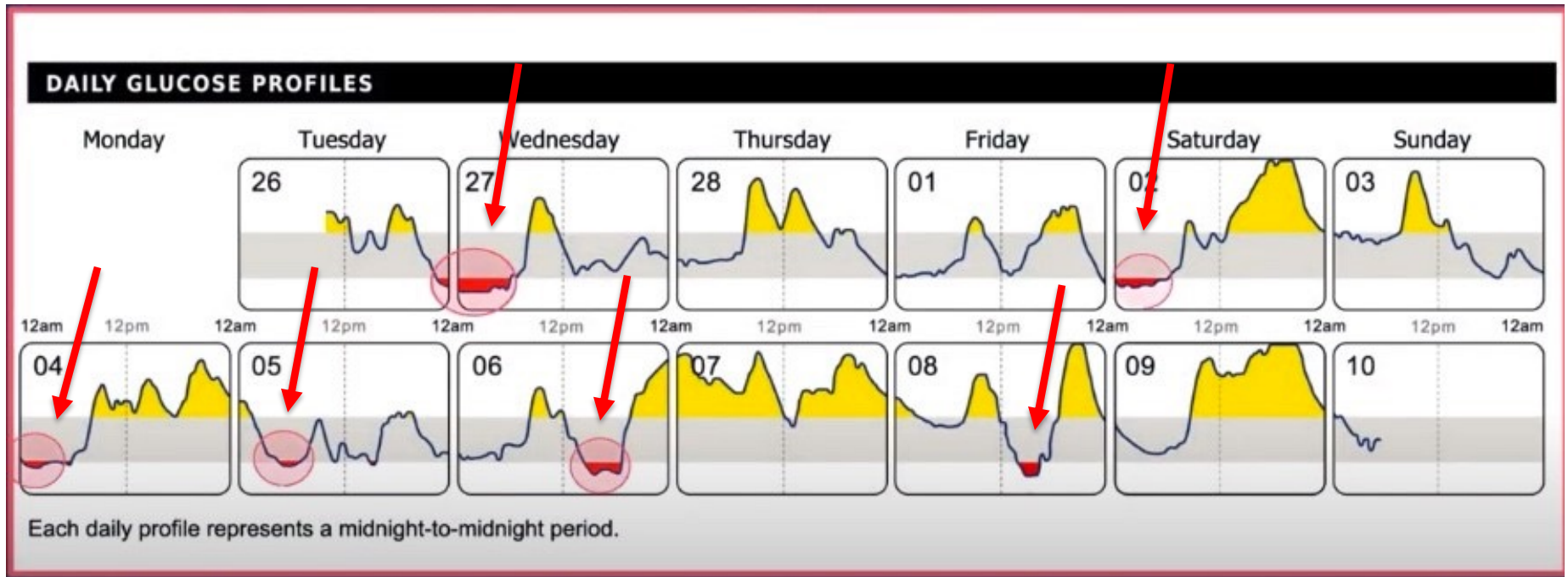


- **BG Meter auto-data review usually commences after power up**
- **Consider the “2-minute drill” → Press “on” button & explore meter**

Ambulatory Glucose Profiles (AGPs)



AGP Daily Snapshot



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

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 CGM into 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



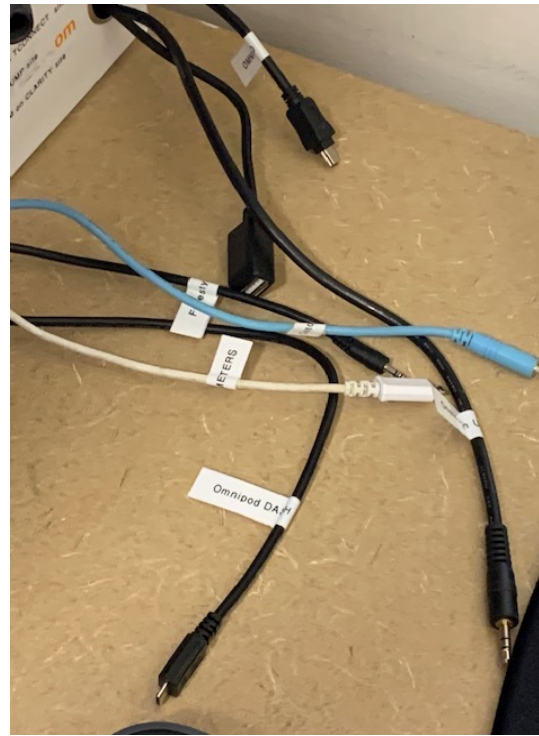
**Administrative Staff
Medical Assistants
Nurses
Dieticians
Clinicians**



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 - (BGMs & CGMs “*Many devices - one place to upload!*”)**
 - Provider link: <https://provider.tidepool.org/>
 - Compatibility link: <https://www.tidepool.org/devices>

Systematic Approach to Patient with Diabetes



Engage & Explore



Screen & Monitor



Use Technology



Customize

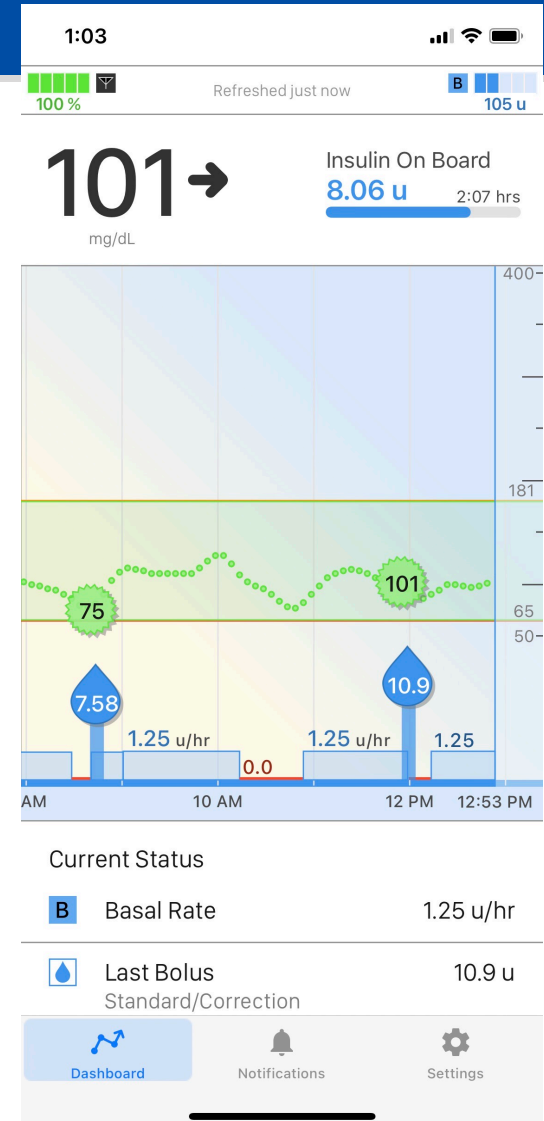
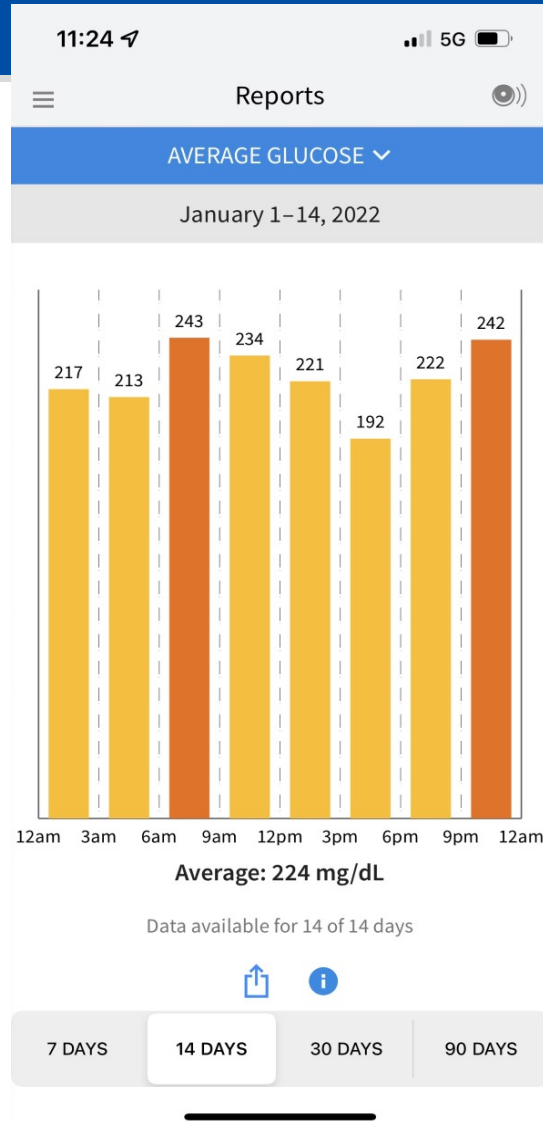
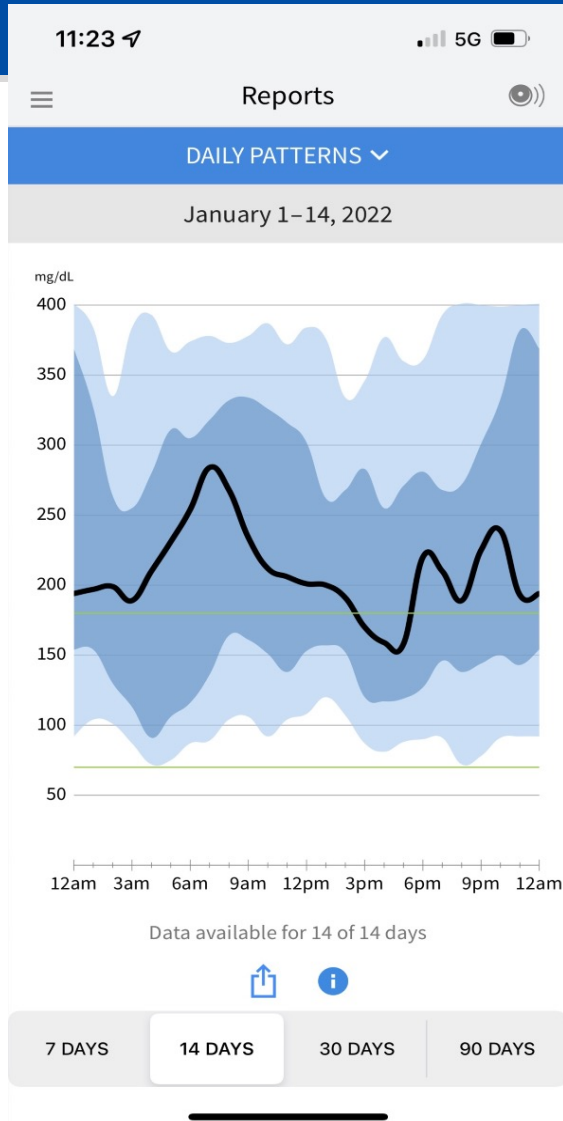


Support & Follow

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 & compliment them
- **Patient forgot to hand BG meter to MA for downloading**
 - Hand it back to your “Crackerjack” MA to download
 - Always thank & compliment them
- **Patient doesn’t know how to access reports on smartphone**
 - Ask them permission to review it yourself
 - Use as a “teaching moment” to encourage self-management
- **Patient forgets BG meter or CGM receiver in car or at home**
 - *“Always bring your BG meter or CGM receiver to clinic visits!”*

No CGM Data Download Report? No problem!



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

Case 1

- **42 yo presents for T1DM 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:**
 - 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?**

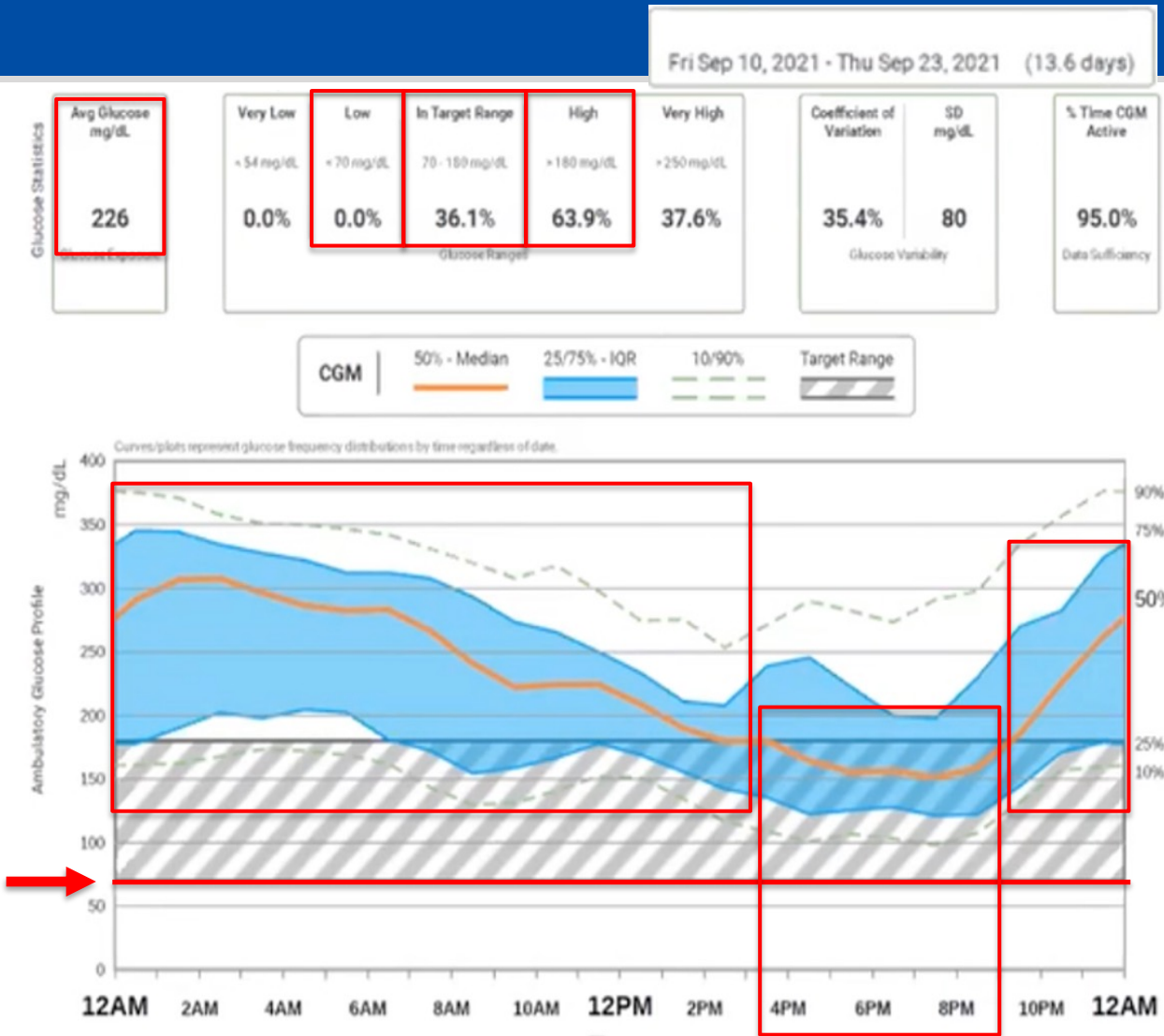
Case 1 – Pop Quiz

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

- **DM Rx:**
 - Insulin Glargine 30 units at HS
 - Insulin Lispro 8 units with meals

- 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

Case 1 - Patient returns to review Professional CGM results



AGP Assessment:

1. TBR: 0%
2. TIR: 36%
3. TAR: 64%
4. Avg BG: 226

Patterns Assessment:

1. No hypoglycemia
2. TIR: 4-8pm; lowest to 100's
3. Significant PP hyperglycemia mid-PM to mid-afternoon
4. BG's > goal most of day

Plan:

1. Increase PM meal bolus insulin by 20% (to 10 units)
2. Increase basal insulin by 10% (to 33 units)

Case 2

60 yoM with a PMH of T2DM, HTN & HLD presents for DM f/u:

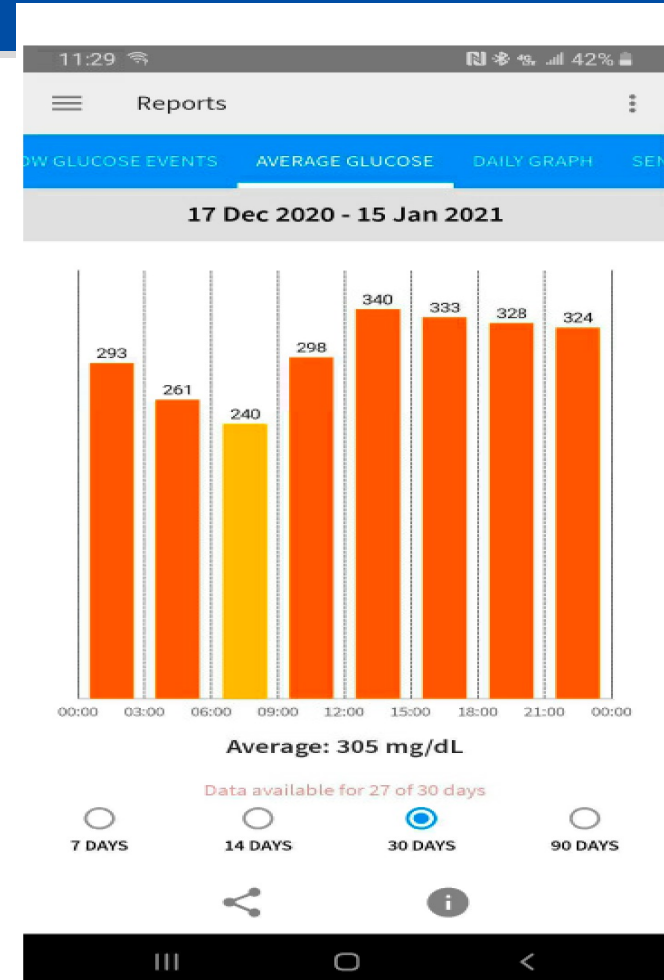
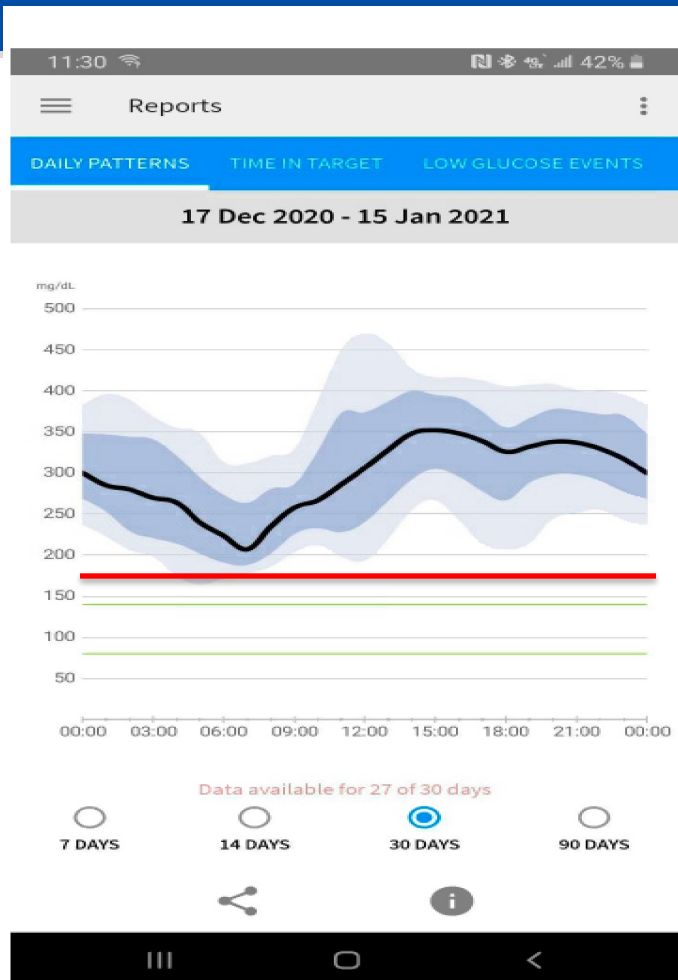
DM Rx:

- Metformin XR 2000mg daily
- Insulin Glargine 60 units in PM (basal)
- Insulin Lispro 5 units with meals (bolus) PLUS BG correction scale
 - BG Correction sliding scale: 2 units/50 above 100

Glucose Monitoring:

- Using rtCGM → **but forgot his CGM scanner...**

Case 2 – 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 2 – 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% uptrend; goal of <7%**
- **AGP: 100% TAR with no hypos**
 - **Pre-meal averages: all > 70-180**
- **Elevated CVD Risk: FRS: 10%**

Plan:

• T2DM:

1. **Start GLP-1 – Semaglutide for glycemic, MACE & wt loss benefits**
 - **0.25mg weekly x 4 weeks then to 0.5mg & maintain until f/u**
2. **Continue 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 Insulin Lispro at current dosing & Metformin
4. Initiate individualized weight loss considerations, diet & activity plan as directed
5. Follow-up in 3 months

BBC: Basal-Bolus-Correction insulin; **MTF:** Metformin; **MACE:** Major adverse cardiac events

Case 2 – 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%

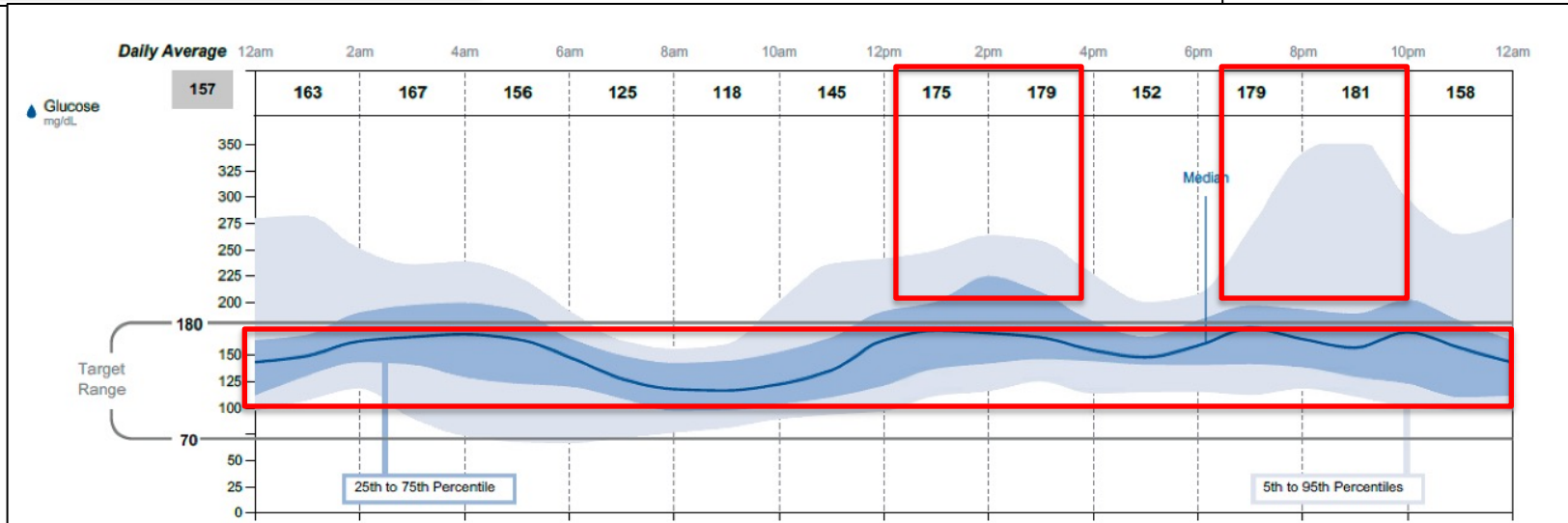
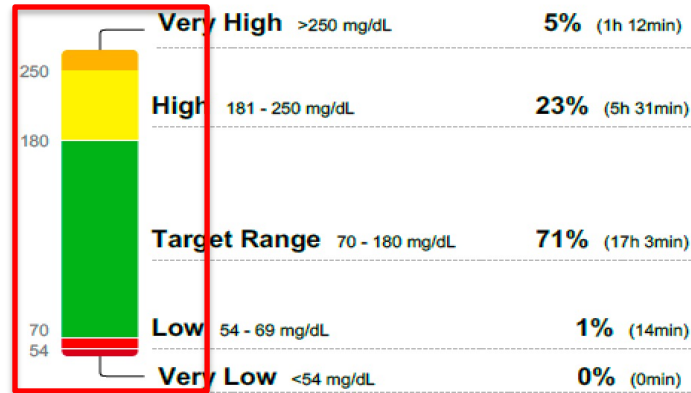
Ranges And Targets For Type 1 or Type 2 Diabetes

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 averages near upper limits of target**
3. **Some HS variability based on PM meal carbs; pre-meal BG averages improved.**

Case 3

- **62-year-old with T2DM (‘20) & BMI of 38.** Complains she’s only lost a few pounds after multiple unsuccessful attempts at lifestyle changes including stricter BG monitoring, added 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 3 - AGP



1. **AGP: 72% TIR & 28% TAR with 0% hypos**
2. **Pre-meal BG averages 210-240's**
3. **Elevated glucose variability**

Case 3 – 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 & pre-meal averages above goal**
- **Weight above goal - BMI of 38 & motivated for lifestyle changes**
 - **Blaming self for failing unrealistic goals**
 - **Not giving herself credit for 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 → Semaglutide 0.25mg x 4 wks then 0.5mg weekly until next f/u**
 - **Continue Metformin 1000mg BID**
 - **Follow-up in 3 months**

Case 3 – AGP: 3 Month Follow-up

Glucose (BG)

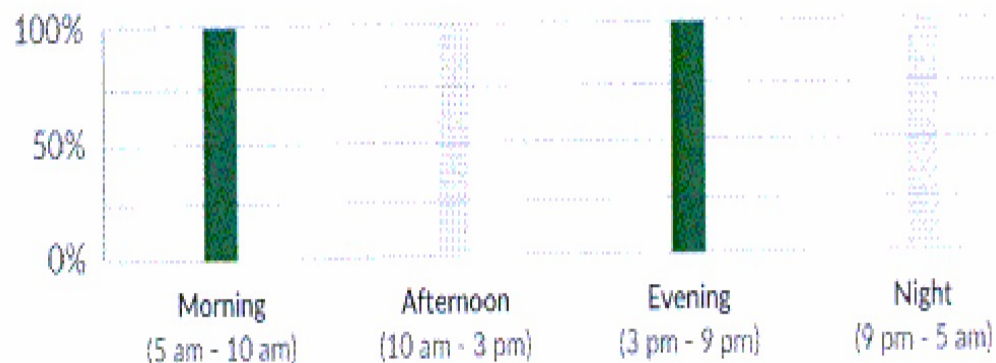
- Very High
- High
- Target Range
- Low
- Very Low

All Readings

0%	> 250 mg/dL
0%	181-250 mg/dL
100%	70-180 mg/dL
0%	54-69 mg/dL
0%	< 54 mg/dL

Average	141 mg/dL
SD	18 mg/dL
Readings/Day	0.5
Median	137 mg/dL
Highest	172 mg/dL
Lowest	111 mg/dL

Time of Day



Readings

Average (mg/dL)
SD (mg/dL)

8	-	6	-
146	-	133	-
19	-	15	-

1. **AGP: 100% TIR & 0% hypos**
2. **Pre-meal BG averages 130-140's**
3. **No evidence of glucose variability**

Case 3 - 3 Month Follow-up A/P

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 via BGM 2x/day**

Assessment: **Controlled T2DM & 7lb Weight loss**

Plan:

- **Lifestyle Plan: Reassess for confidence in maintaining plan**
- **Continue Semaglutide**
 - **Consider future dose increase for further wt loss benefit?**
- **Continue Metformin 1000g BID**

Smart Phrases – 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	xx
Lunch	xx	xx
Supper	xx	xx
Bedtime	xx	xx

Smart Phrases: Glycemia Reports – BG or CGM Downloads

BGM:

- 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

Glycemia Data Report:

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

% Hyperglycemia (>180): XX

% at Target (70-180): XX

% Hypoglycemia (<70): XX

Previous AGP:

40%

54%

6%

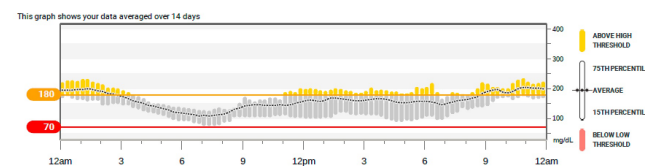
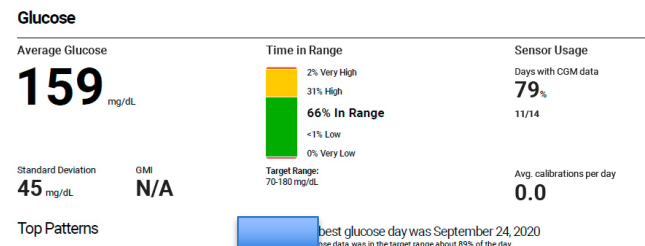
Average BG (mg/dL) values by meals:

AC Bkfst (AM Fasting): XX

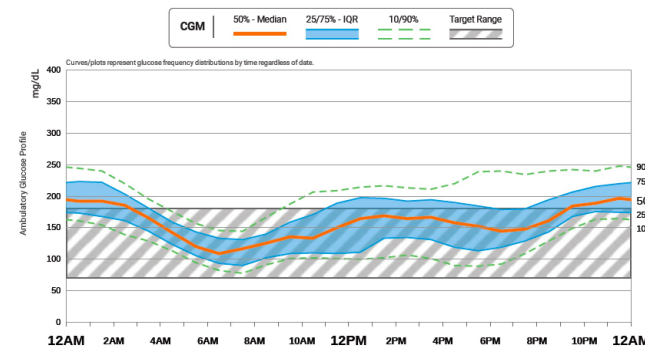
AC Lunch: XX

AC Dinner: XX



HS: XX



Avg Glucose mg/dL	Very Low	Low	In Target Range	High	Very High	Coefficient of Variation	SD mg/dL	% Time CGM Active
159	< 54 mg/dL	< 70 mg/dL	70 - 180 mg/dL	> 180 mg/dL	> 250 mg/dL	28.4%	45	84.8%
Glucose Exposure	0.0%	0.6%	66.1%	33.3%	2.2%	Glucose Variability		Data Sufficiency



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 & Services¹

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

Five 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. Secure access to patients’ CGM data & account login information**
- 5. Avoid nuisance alarms by making CGM alerts/alarms actionable**

Diabetes Tech & CGM Summary

Technology improves diabetes outcomes

Personal or Professional CGM systems are available

Change CGM sensors every 7-14 days

Use CGM 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 data**

Post-Session Questions

1. **When educating patients about differences between blood glucose monitoring (BGM) & continuous glucose monitoring (CGM), you will want to include all the following except:**
 - A. CGMs will provide > 4000 glucose readings in a 2-week period
 - B. CGM systems give the most accurate readings of glucose
 - C. BGM systems give the most accurate readings of glucose
 - D. BGM readings are ~5-10 minutes ahead of CGM readings

Post-Session Questions

- 2. CGMs have shown which of the following effects in clinical trials regarding hypoglycemia?**
- A. CGMs had no effect on time spent in hypoglycemia
 - B. CGMs increased time spent in hypoglycemia
 - C. CGMs reduced minutes/day spent in hypoglycemia with use of first sensor
 - D. CGMs reduced minutes/day spent in hypoglycemia after 3 months of use

Post-Session Questions

- 3. In order to get Medicare coverage for Continuous Glucose Monitors (CGM), patients must meet all following requirements except:**
- 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 results
 - D. Be seen by a diabetes provider within 6 months of CGM Rx & followed at least every 6 months to continue coverage

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	*Yes	*Yes	Yes	Yes

Contact Information

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