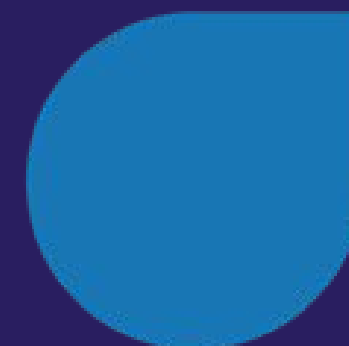
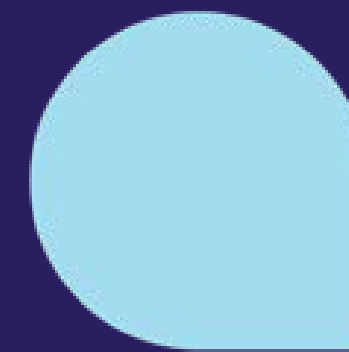




Session 4: Putting it All Together – Case Study

Moderator: Gregg Simonson, PhD

International Diabetes Center

Director, Strategy, Innovation and Partnerships

Richard Bergenstal, MD

International Diabetes Center

Executive Director Emeritus

Thomas Martens, MD

International Diabetes Center

Internal Medicine- Park Nicollet Clinic

Kathryn Leet, RN, CDCES

International Diabetes Center

Diabetes Program Manager



HealthPartners[®] Institute

Faculty Disclosures

Gregg Simonson, faculty for this educational activity, has the following relevant financial relationships:

- Consultant, advisor, or speaker for Abbott, Dexcom, Sanofi

Richard Bergenstal, faculty for this educational activity, has the following relevant financial relationships:

- Consultant, advisor, or speaker for Abbott, Dexcom, Eli Lilly & Co., Novo Nordisk, Roche Diabetes Care, Sanofi, Medtronic, Insulet, Medscape, Vertex Pharmaceuticals, American Diabetes Association, Hygeia, Embecta, Zealand Pharma A/S.
- Researcher for Abbott, Dexcom, Eli Lilly & Co., Novo Nordisk, Medtronic, Insulet, Tandem Diabetes Care

Tom Martens, faculty for this educational activity, has the following relevant financial relationships:

- Consultant, advisor, or speaker for Abbott, Dexcom, Lilly, Medtronic, Novo Nordisk, Sanofi, Insulet, Tandem
- Researcher for Abbott, Dexcom, Lilly, Medtronic, Novo Nordisk, Sanofi, Insulet, Tandem

Kathryn Leet, faculty for this educational activity, has the following relevant financial relationships:

- Consultant, advisor, or speaker for Abbott
- Researcher for Abbott, Insulet

Case Study: Michael

History: 65 y.o. male with 22-year history of type 2 diabetes

Problem list: Type 2 diabetes, hypertension, hypercholesterolemia, diabetic neuropathy, diabetic retinopathy, PVD

Chief complaint: “I know what I need to be doing, but it is hard to do”

Social history: Single, no children, retired

Physical exam: Height 68 inches, weight 281 lbs. (128 kg) BMI 42.7, BP 127/75 mmHg

Health habits: Nonsmoker, occasional alcohol; no regular physical activity

Glucose monitoring: Libre 3+ CGM, no routine BGM; no reported symptoms of hypoglycemia

Nutrition history: Eats 3 meals/day with occasional snacks

Current 10-year ASCVD risk: 18%

Laboratory results:

A1C 8.5%; fasting BG 165 mg/dL

Lipids - LDL 97 mg/dL

HDL 45 mg/dL

Triglycerides 177 mg/dL

eGFR >60 mL/min

Albumin/creatinine ratio 17 mg/g

AST 47 units/L

Current medications:

Metformin XR x 1000 mg BID

Semaglutide 2 mg/week

Insulin degludec 85 units/day at bedtime

Insulin lispro 10 units/meal

Lisinopril: 10 mg/day

Atorvastatin: 40 mg/day

Aspirin: 81 mg/day

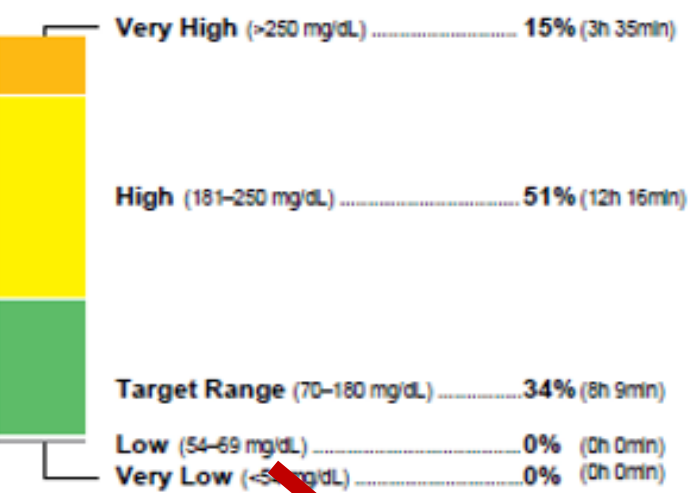


Michael's Libre 3+ CGM data

GLUCOSE STATISTICS AND TARGETS

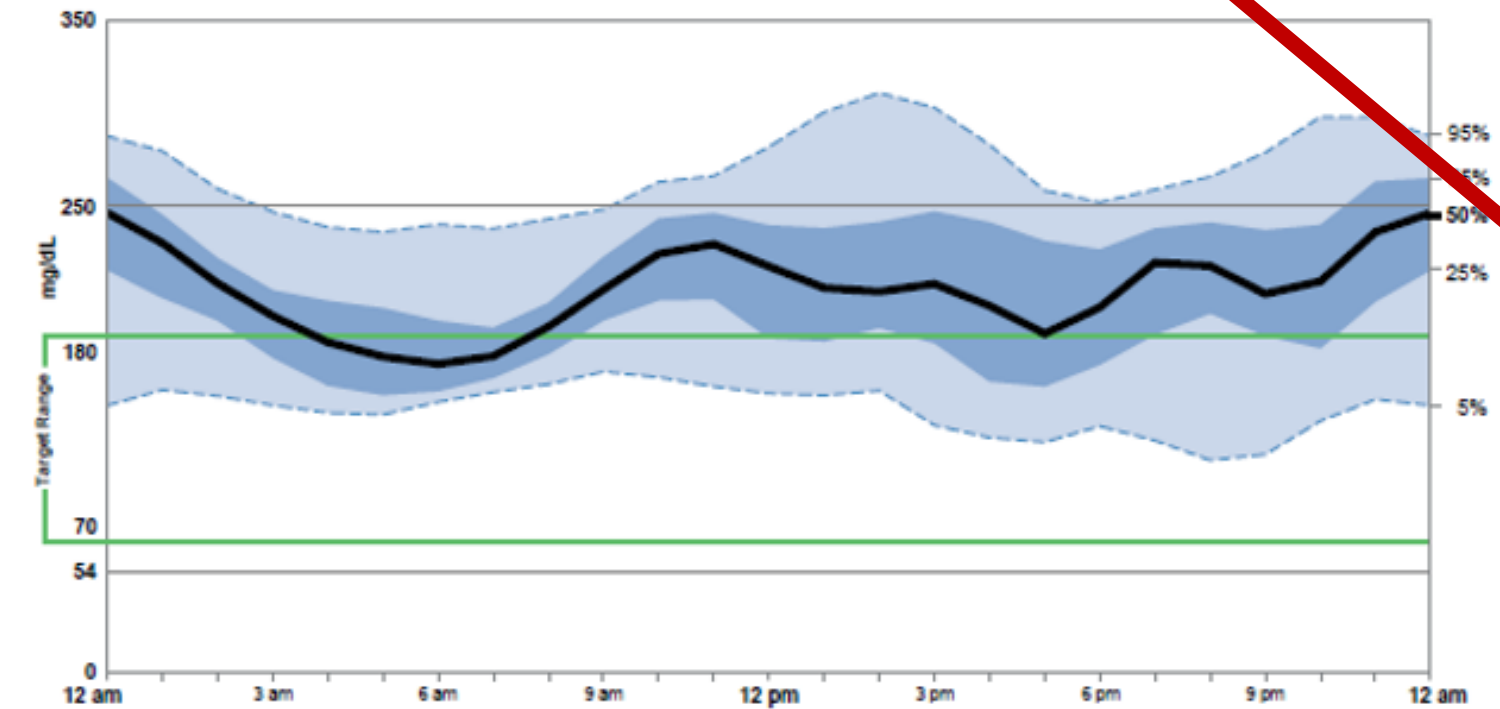
% Time CGM is Active	14 days 97.6%
Glucose Ranges	Targets [% of Readings (Time/Day)]
Target Range 70–180 mg/dL	Greater than 70% (16h 48min)
Below 70 mg/dL	Less than 4% (58min)
Below 54 mg/dL	Less than 1% (14min)
Above 180 mg/dL	Less than 25% (6h)
Above 250 mg/dL	Less than 5% (1h 12min)
Each 5% increase in time in range (70–180 mg/dL) is clinically beneficial.	
Average Glucose	203 mg/dL
Glucose Management Indicator (GMI)	8.2%
Glucose Variability	21.5%
Defined as percent coefficient of variation (%CV); target $\leq 36\%$	

TIME IN RANGES

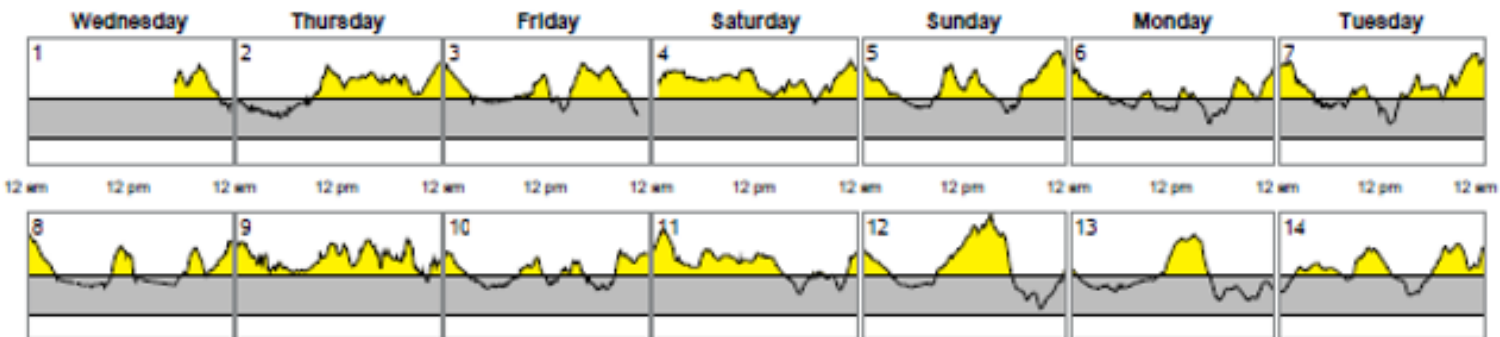


AMBULATORY GLUCOSE PROFILE (AGP)

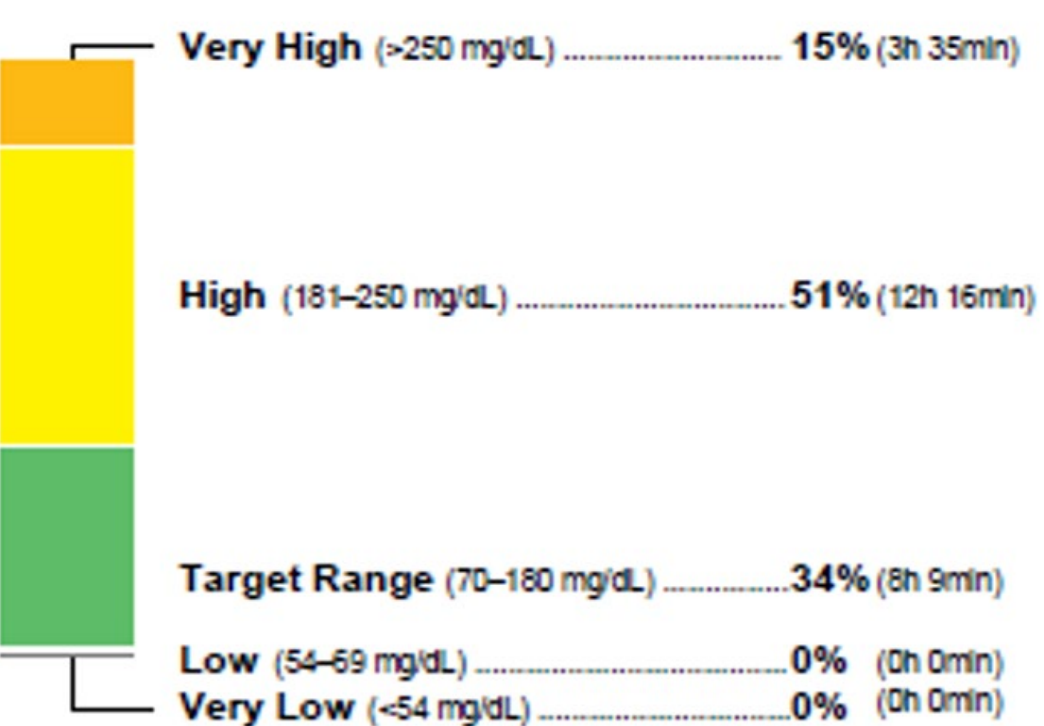
AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if they occurred in a single day.



DAILY GLUCOSE PROFILES



TIME IN RANGES



Average Glucose	203 mg/dL
Glucose Management Indicator (GMI)	8.2%
Glucose Variability	21.5%
Defined as percent coefficient of variation (%CV); target $\leq 36\%$	

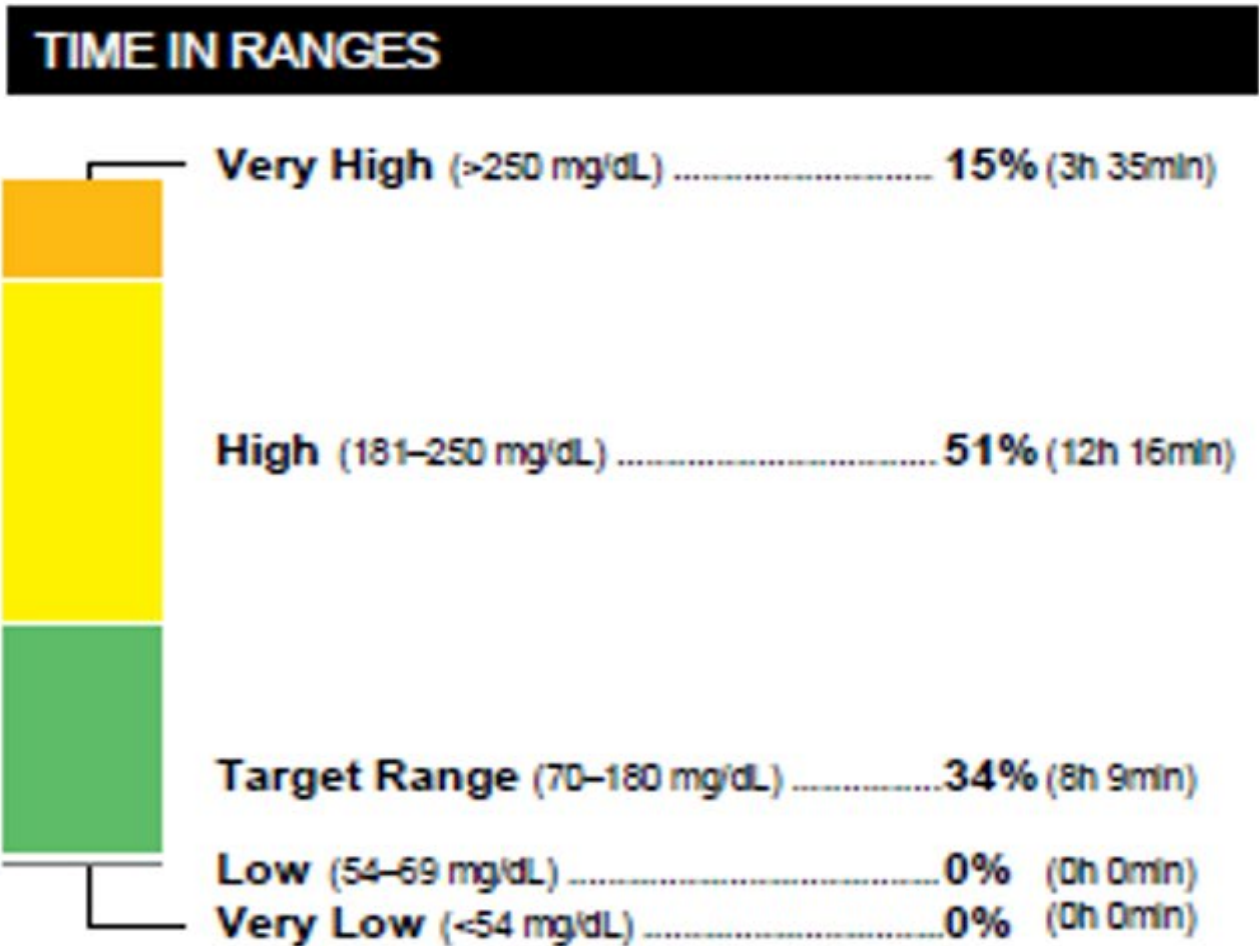


Question 1: After reviewing the time in ranges bar, are his time in ranges to goal?

☐ YES ☐ NO

If no, what is/are the goal(s)? Is action needed?

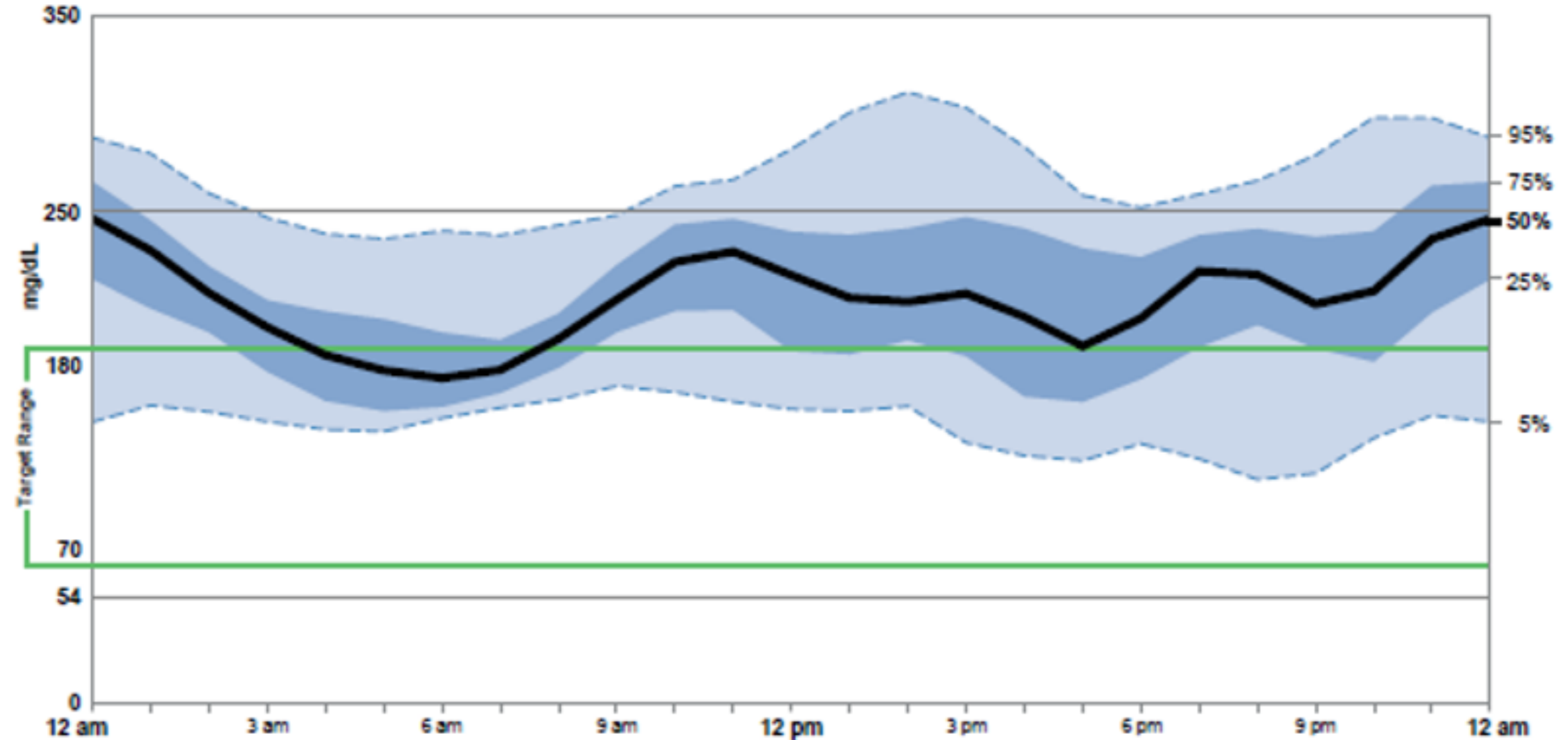
GLUCOSE STATISTICS AND TARGETS	
	14 days
% Time CGM is Active	97.6%
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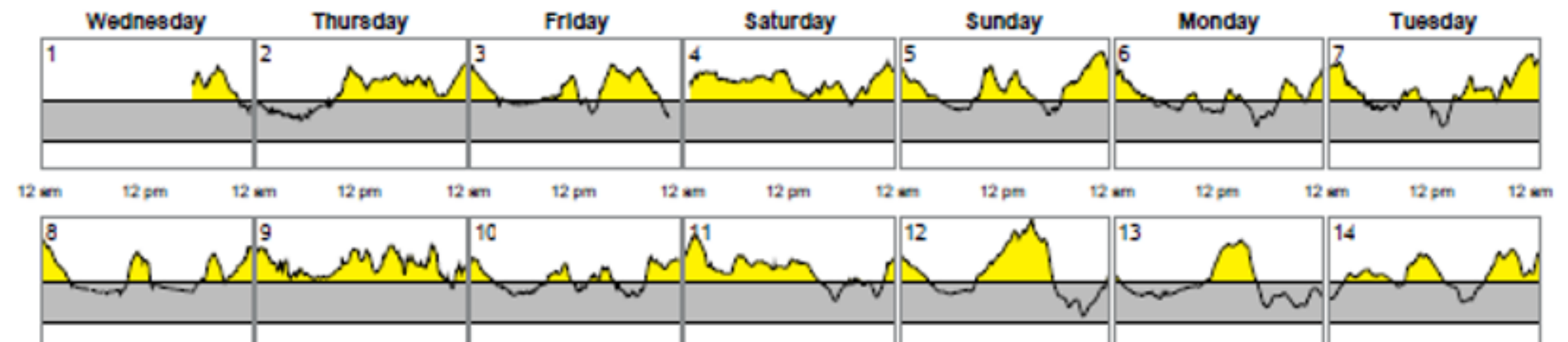
Question 2: Using the “Determine Where to Act” steps to review the AGP Report, what would you address FIRST for Michael?

AMBULATORY GLUCOSE PROFILE (AGP)

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



DAILY GLUCOSE PROFILES



Each daily profile represents a midnight-to-midnight period.

Case Study: Assessment

Question 3: What factors (e.g., age, medical history, comorbidities, financial, current therapy) would you consider when making treatment recommendations?

Question 4: Which CCGM category is Michael classified in?

Question 5: Using the CCGM tool, what medication change(s) would you make for Michael?

History: 65 y.o. male with 22-year history of type 2 diabetes

Problem list: Type 2 diabetes, hypertension, hypercholesterolemia, diabetic neuropathy, diabetic retinopathy, PVD

Chief complaint: "I know what I need to be doing, but it is hard to do"

Social history: Single, no children, retired

Physical exam: Height 68 inches, weight 281 lbs. (128 kg), BMI 42.7, BP 127/75 mmHg

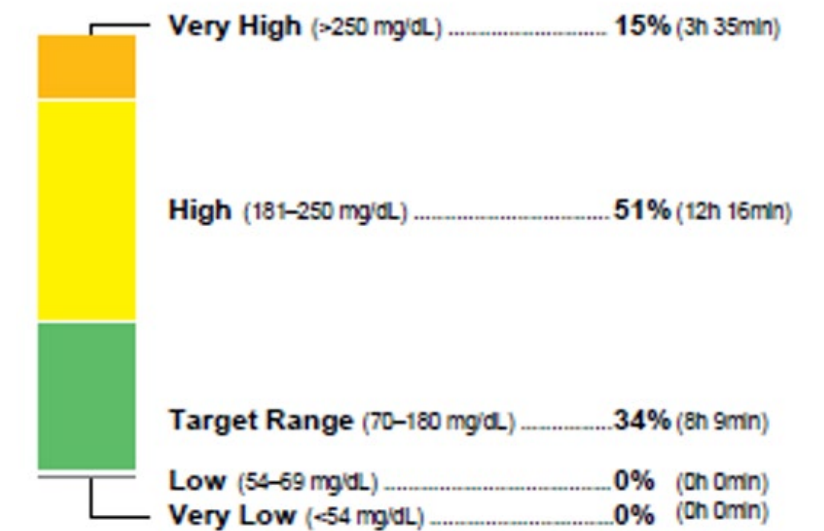
Health habits: Nonsmoker, occasional alcohol; no regular physical activity

Glucose monitoring: Libre 2 CGM, no routine BGM; no reported symptoms of hypoglycemia

Nutrition history: Eats 3 meals/day with occasional snacks

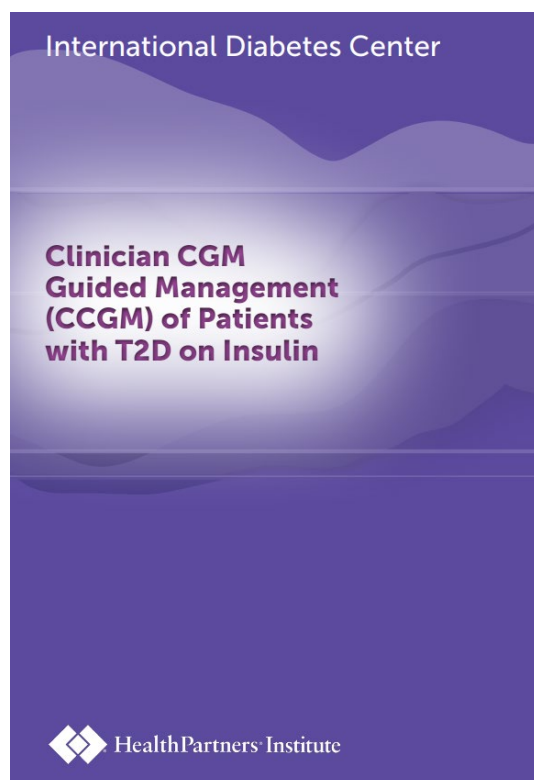
Current 10-year ASCVD risk: 18%

TIME IN RANGES



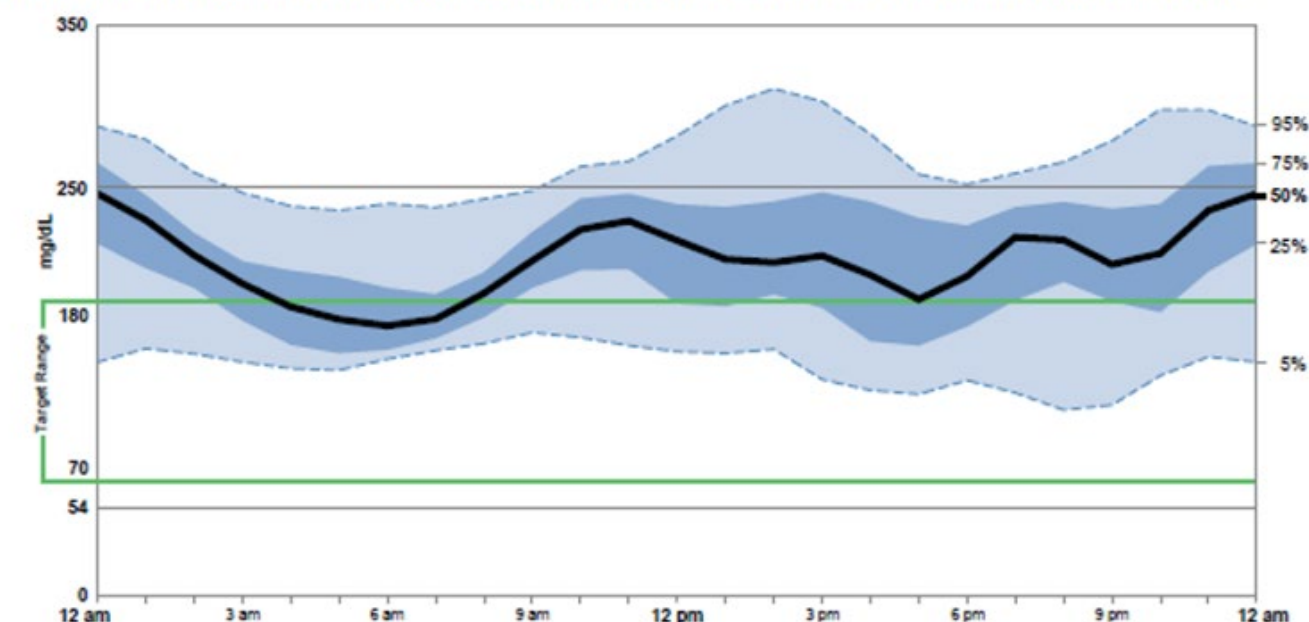
GLUCOSE STATISTICS AND TARGETS

% Time CGM is Active		14 days
		97.6%
Glucose Ranges	Targets	[% of Readings (Time/Day)]
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AMBULATORY GLUCOSE PROFILE (AGP)

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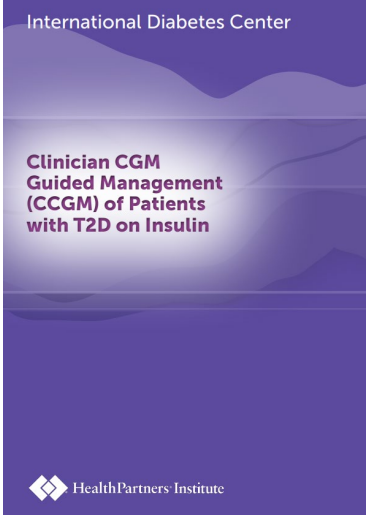


Clinician CGM Guided Management: For Patients on Basal and Bolus Insulin

	TIR/TBR Category	Action	Medication Adjustment Considerations
1	Time in range >70% and Time below range <3%	Continue regimen	Continue to optimize current therapy and reinforce lifestyle changes and taking medications as prescribed. CONSIDER further intensification of insulin if appropriate: • Step 1: Address postmeal hyperglycemia: If there is a postmeal rise of >50 mg/dL in the median line after any meal, increase the mealtime bolus insulin dose before that meal by 5% • Step 2: Address basal insulin: If there is a drop of >50 mg/dL in the median line between bedtime and morning meal, decrease basal insulin dose by 5% • Step 3: If no change based on steps 1 or 2: Increase basal insulin dose by 5% Follow-up: 3-4 months
2	Time in range >70% and Time below range ≥3%	Address hypoglycemia	If low* overnight decrease basal insulin** If low* at one specific time during the day decrease mealtime bolus dose** prior to the low If low* glucose occurs throughout the day and night decrease total daily insulin dose (TDD)** Follow-up: 2-4 weeks
3	Time in range ≤70% and Time below range <3%	Address hyperglycemia	Start or increase dose of GLP-1 RA or GIP/GLP-1 RA AND if TIR is 50-70% decrease total daily insulin dose (TDD) by 20% If GLP-1 RA or GIP/GLP-1 RA not started or increased, then adjust insulin doses according to current TIR: • If TIR <50%: —If not on all-meal coverage, move to all-meal coverage by increasing TDD by 10% and using Table B to calculate new regimen. —If on all meal coverage, increase TDD by 10% and redistribute insulin 50:50 between basal and bolus insulin • If TIR 50-70%: review AGP curve and adjust insulin based on median line as follows: —Step 1: Address postmeal hyperglycemia: If there is a postmeal rise of >50 mg/dL in the median line after any meal, either increase the mealtime bolus insulin dose before that meal by 10% or start mealtime bolus insulin at that meal (see stepwise approach, Table A) —Step 2: Address basal insulin: If there is a drop of >50 mg/dL in the median line between bedtime and morning meal, decrease basal insulin dose by 10%, unless basal insulin dose was reduced in Step 1 based on stepwise approach shown in Table A —Step 3: If no change based on steps 1 or 2: Increase basal insulin dose by 10% Follow-up: 2-4 weeks
4	Time in range ≤70% and Time below range ≥3%	Address hypoglycemia today; also refer to diabetes education or endocrinology	If low* overnight decrease basal insulin** If low* at one specific time during the day decrease mealtime bolus dose** prior to the low If low* glucose occurs throughout the day and night decrease total daily insulin dose (TDD)** Refer to diabetes education or endocrinology to treat hyperglycemia while avoiding hypoglycemia; they may recommend adding or adjusting GLP-1 RA or GIP/GLP-1 RA. If one of these is not started or increased, then insulin may be redistributed 50:50 between basal and bolus insulin and/or individual insulin doses titrated Follow-up: 2-4 weeks

* Low glucose defined as 5% line dropping below 70 mg/dL on AGP curve AND not due to just a single day after review of daily profiles

** Insulin dose reduction guidance: If TBR <10% reduce insulin dose(s) by 10%; if TBR ≥10% reduce insulin dose(s) by 20%



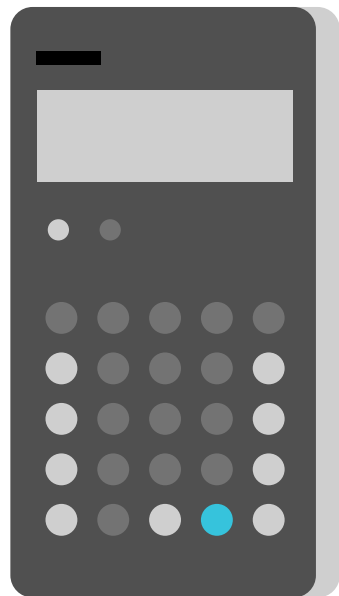
Start or increase dose of GLP-1 RA or GIP/GLP-1 RA **AND** if TIR is 50-70% decrease total daily insulin dose (TDD) by 20%

If GLP-1 RA or GIP/GLP-1 RA not started or increased, then adjust insulin doses according to current TIR:

- If TIR <50%:
 - If **not** on all-meal coverage, move to all-meal coverage by increasing TDD by 10% and using Table B to calculate new regimen.
 - If **on** all meal coverage, increase TDD by 10% and redistribute insulin 50:50 between basal and bolus insulin
- If TIR 50-70%: review AGP curve and adjust insulin based on **median line** as follows:
 - Step 1:** Address postmeal hyperglycemia: If there is a postmeal rise of >50 mg/dL in the median line after any meal, either increase the mealtime bolus insulin dose before that meal by 10% or start mealtime bolus insulin at that meal (see stepwise approach, Table A)
 - Step 2:** Address basal insulin: If there is a drop of >50 mg/dL in the median line between bedtime and morning meal, decrease basal insulin dose by 10%, unless basal insulin dose was reduced in Step 1 based on stepwise approach shown in Table A
 - Step 3:** If no change based on steps 1 or 2: Increase basal insulin dose by 10%

Follow-up: 2-4 weeks

New Insulin Dose Calculation



Michael's current total daily insulin dose (**TDD**) = **115 units**

Insulin degludec 85 units/day at bedtime

Insulin lispro 10 units/meal x 3 meals

Increase TDD by 10%

115 units x 0.1 = 11.5 units rounded to 11 units

New dose = 126 units distributed 50% as background insulin and 50% divided before each of three meals

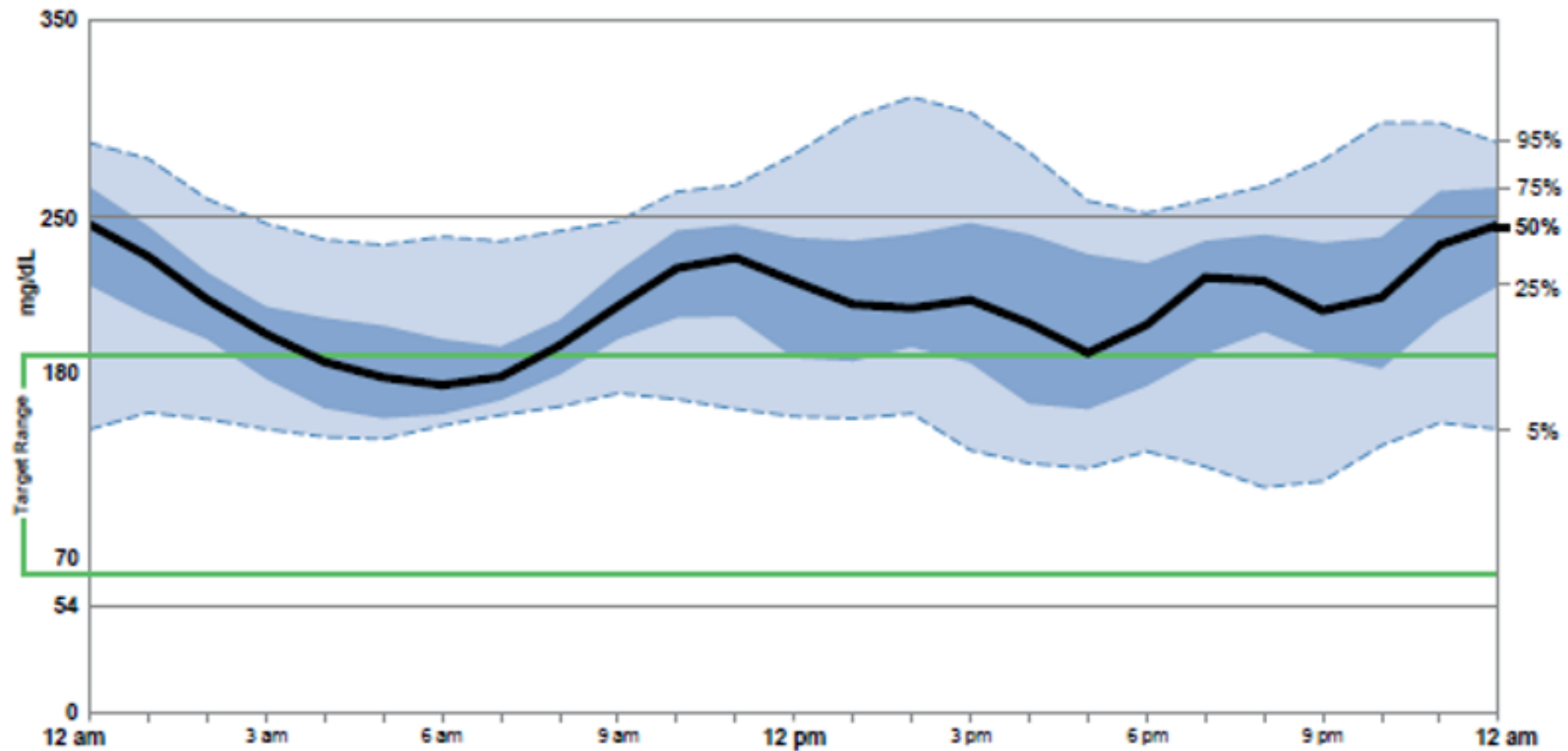
New regimen:

63 units/day insulin degludec at bedtime

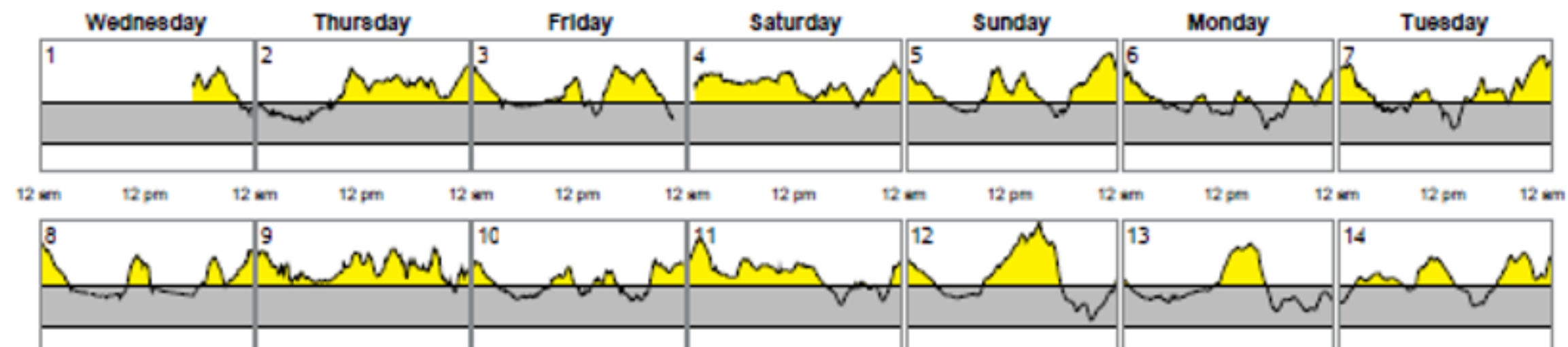
21 units of insulin lispro before each meal

AMBULATORY GLUCOSE PROFILE (AGP)

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DAILY GLUCOSE PROFILES



Each daily profile represents a midnight-to-midnight period.



Case Study: Assessment

Question 6: What self-management, nutrition or lifestyle recommendations would you provide at this visit? What is your rationale for the recommendations?

Question 7: When would you follow up with Michael?

History: 65 y.o. male with 22-year history of type 2 diabetes

Problem list: Type 2 diabetes, hypertension, hypercholesterolemia, diabetic neuropathy, diabetic retinopathy, PVD

Chief complaint: “I know what I need to be doing, but it is hard to do”

Social history: Single, no children, retired

Physical exam: Height 68 inches, weight 281 lbs. (128 kg), BMI 42.7, BP 127/75 mmHg

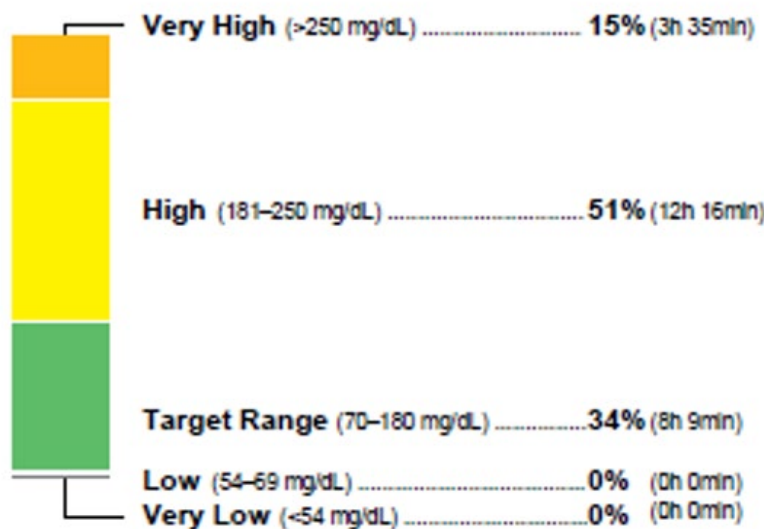
Health habits: Nonsmoker, occasional alcohol; no regular physical activity

Glucose monitoring: Libre 2 CGM, no routine BGM; no reported symptoms of hypoglycemia

Nutrition history: Eats 3 meals/day with occasional snacks

Current 10-year ASCVD risk: 18%

TIME IN RANGES

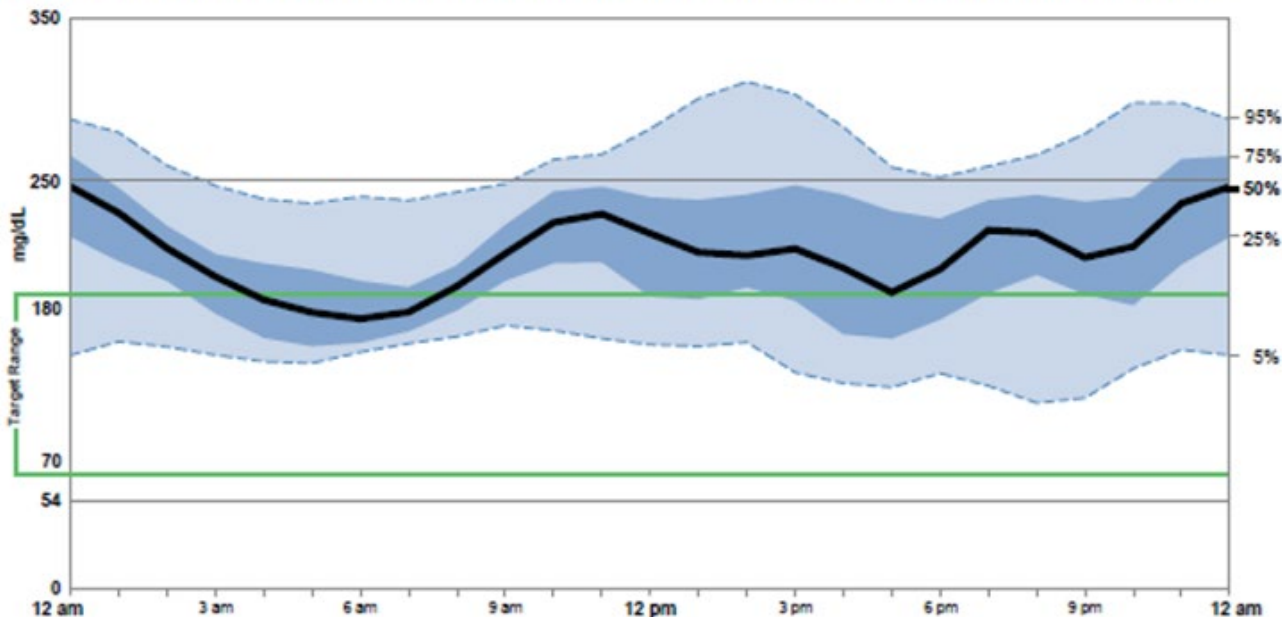


GLUCOSE STATISTICS AND TARGETS

1 Jan 2020–14 Jan 2020	14 days
% Time CGM is Active	97.6%
Glucose Ranges	Targets [% of Readings (Time/Day)]
Target Range 70–180 mg/dL	Greater than 70% (16h 48min)
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Questions?

**Write your question in the chat
or raise your hand in Teams**



Case Study: Michael

History: 65 y.o. male with 22-year history of type 2 diabetes

Problem list: Type 2 diabetes, hypertension, hypercholesterolemia, diabetic neuropathy, diabetic retinopathy, PVD

Chief complaint: “I know what I need to be doing, but it is hard to do”

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Nutrition history: Eats 3 meals/day with occasional snacks

Current 10-year ASCVD risk: 18%

Laboratory results:

A1C 8.5%; fasting BG 165 mg/dL

Lipids - LDL 97 mg/dL

HDL 45 mg/dL

Triglycerides 177 mg/dL

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Albumin/creatinine ratio 17 mg/g

AST 47 units/L

Current medications:

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Insulin degludec 85 units/day at bedtime

Insulin lispro 10 units/meal

Lisinopril: 10 mg/day

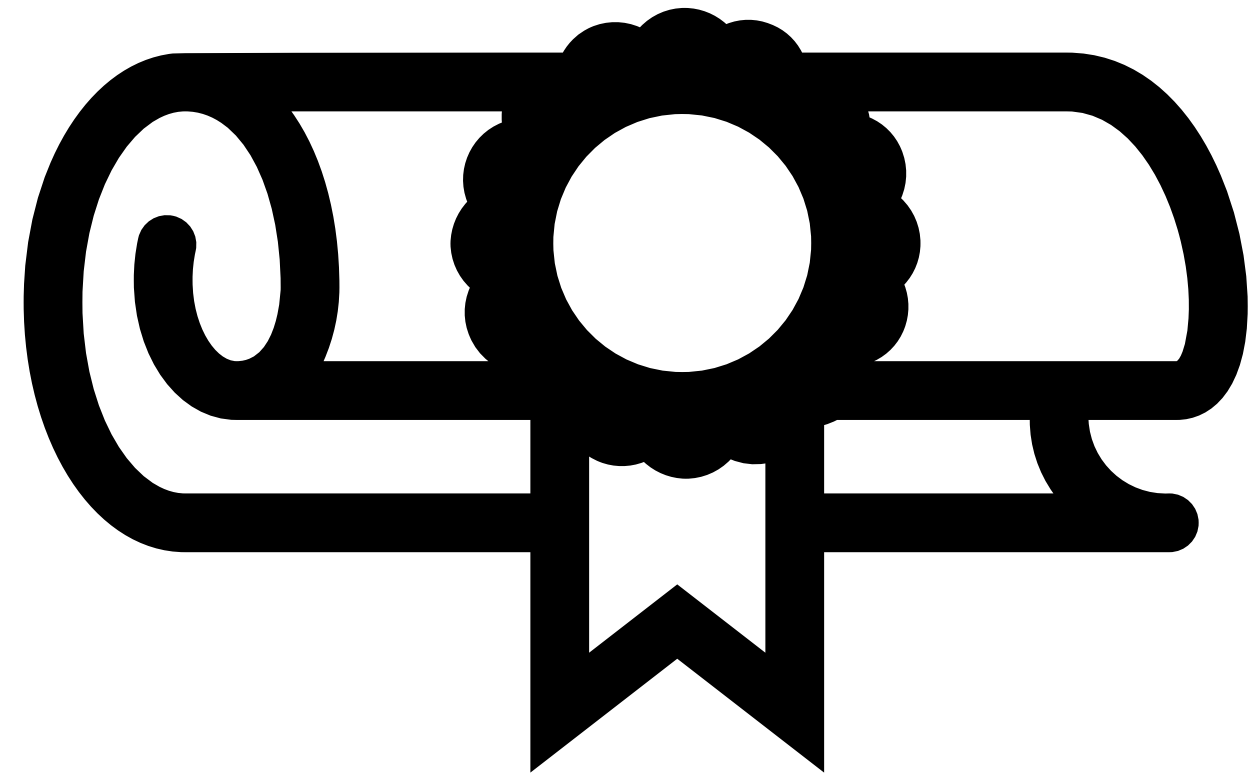
Atorvastatin: 40 mg/day

Aspirin: 81 mg/day



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 - Upon completion of all evaluation questions, your credit will be made available for download immediately.



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