Session 4: Putting it All Together – Case Study

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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:

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

- Consultant, advisor, or speaker for Abbott
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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/creatine 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

	14 days
% Time CGM is Active	97.6%

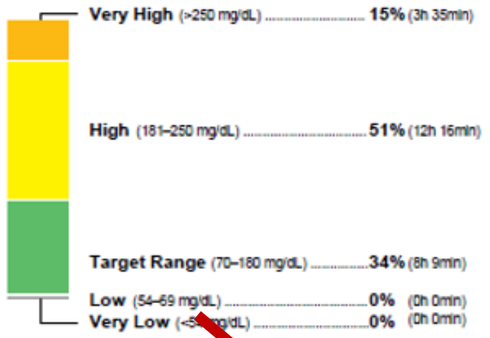
Glucose Ranges	Targets [% of Readings (Time/Day)]
Target Range 70–180 mg/dL	Greater than 70% (16h 48min)
Below 70 mg/dL	Less than 4% (58min)
Below 54 mg/dL	Less than 1% (14min)
Above 180 mg/dL	Less than 25% (6h)
Above 250 mg/dL	Less than 5% (1h 12min)

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%

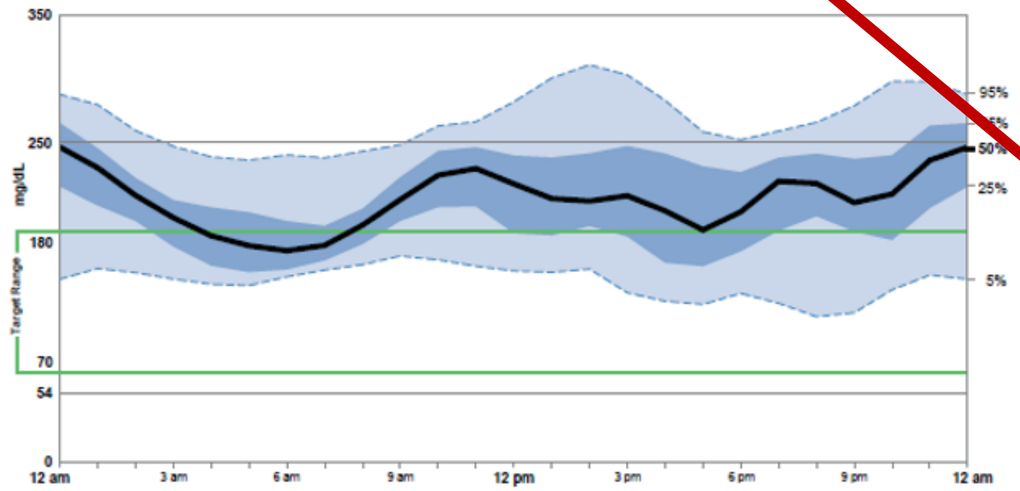
Defined as percent coefficient of variation (%CV); target ≤36%

TIME IN RANGES

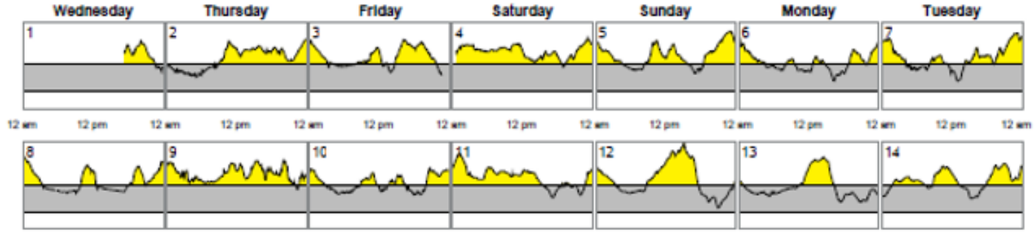


AMBULATORY GLUCOSE PROFILE (AGP)

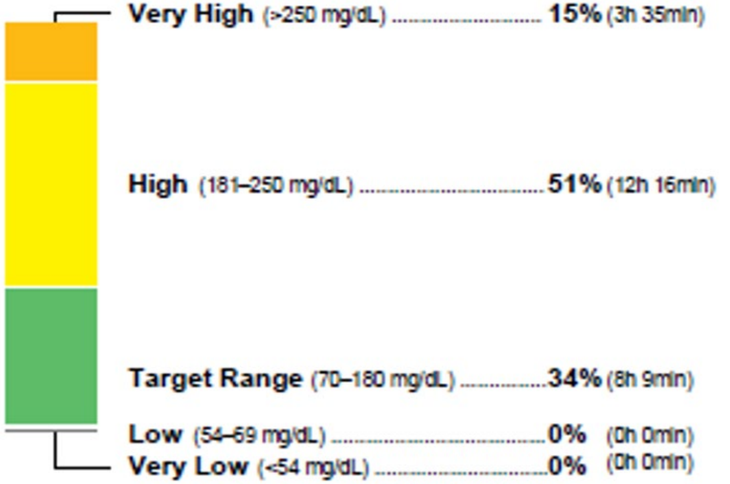
AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if they occurred in a single day.



DAILY GLUCOSE PROFILES



TIME IN RANGES



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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%**

Glucose Ranges	**Targets** [% of Readings (Time/Day)]
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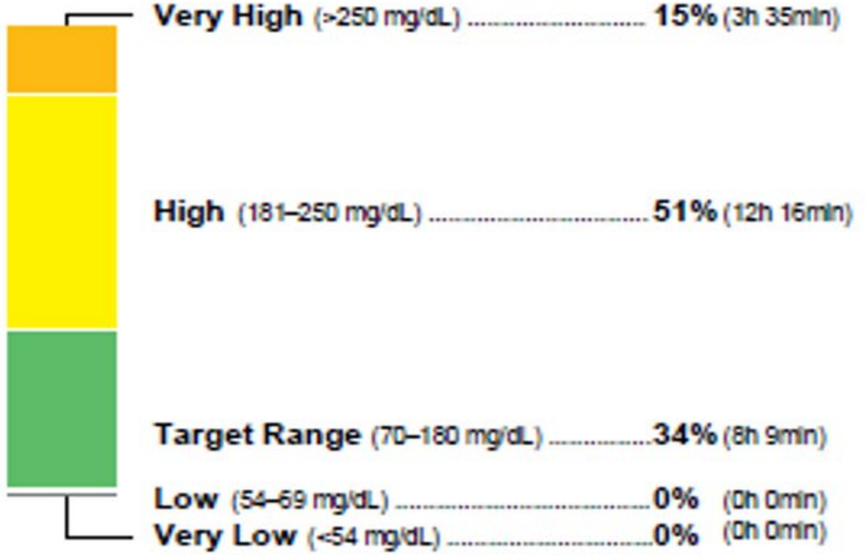
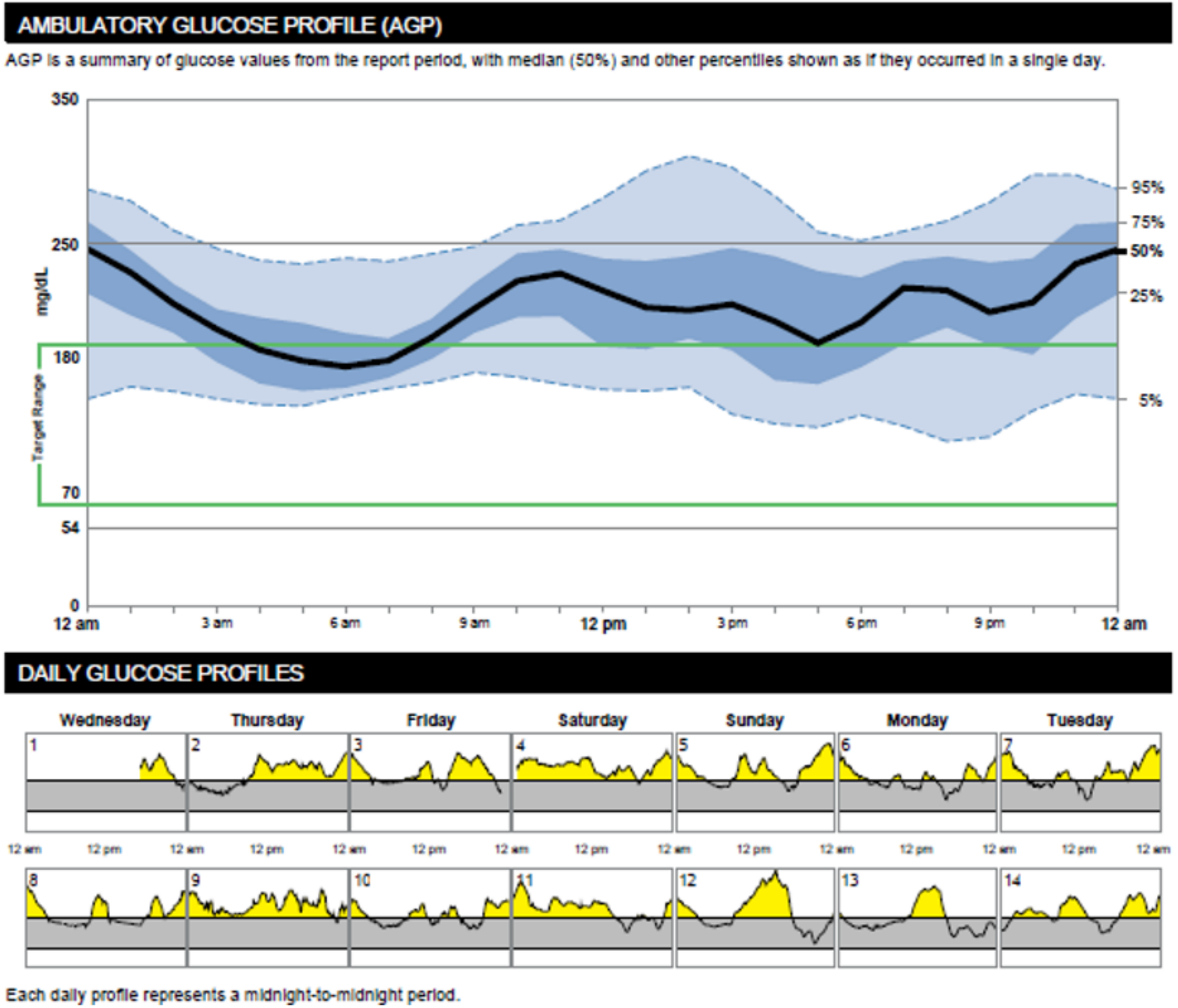
TIME IN RANGES



Question 2: Using the “Determine Where to Act” steps to review the AGP Report, what would you address FIRST for Michael?

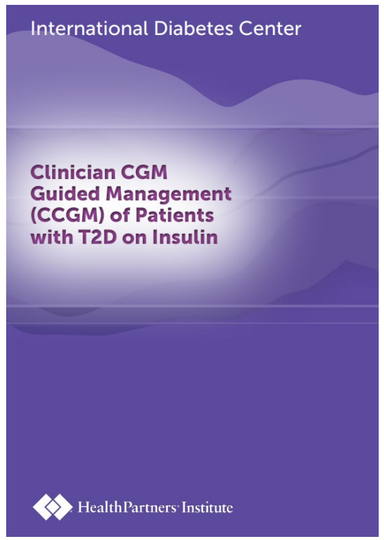


Case Study: Assessment

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"

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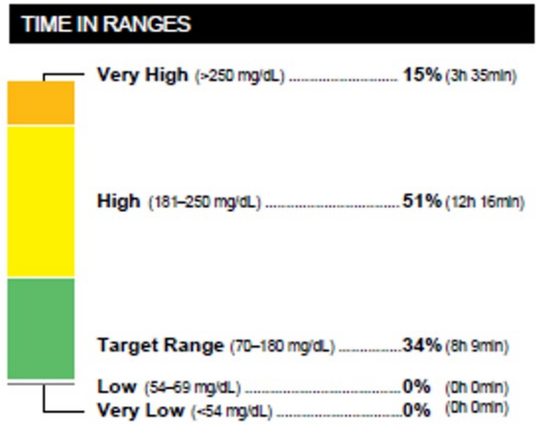
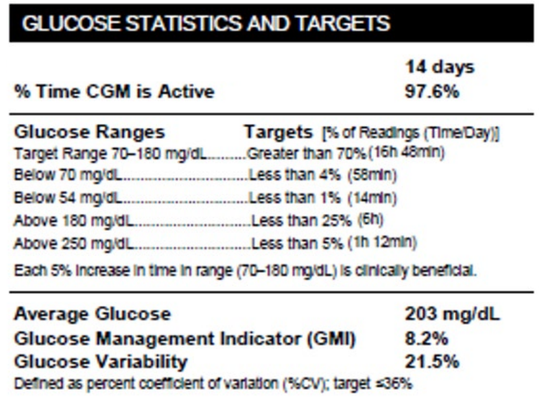
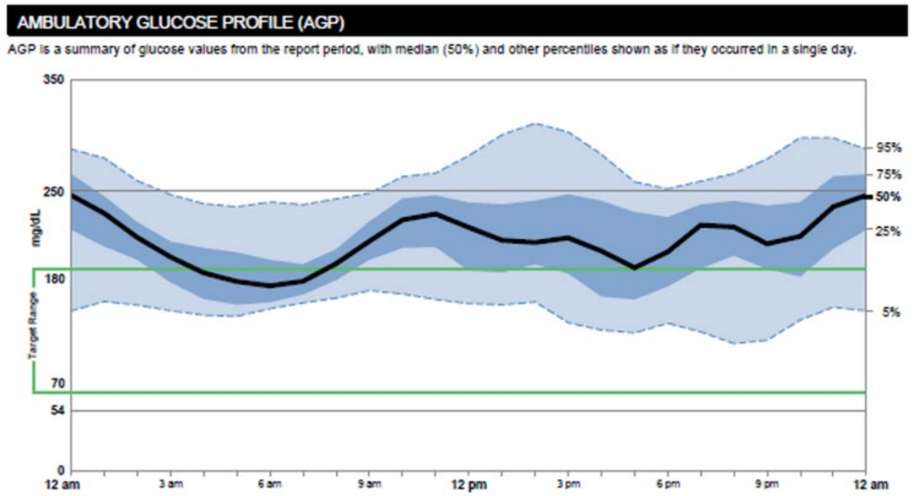
Glucose monitoring: Libre 2 CGM, no routine BGM; no reported symptoms of hypoglycemia

Nutrition history: Eats 3 meals/day with occasional snacks

Current 10-year ASCVD risk: 18%





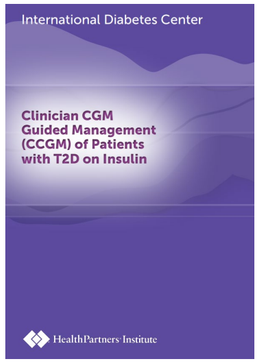


Clinician CGM Guided Management: For Patients on Basal and Bolus Insulin

	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%



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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:
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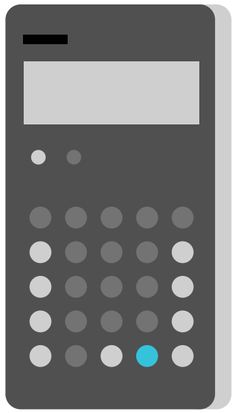
Follow-up: 2-4 weeks

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

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?

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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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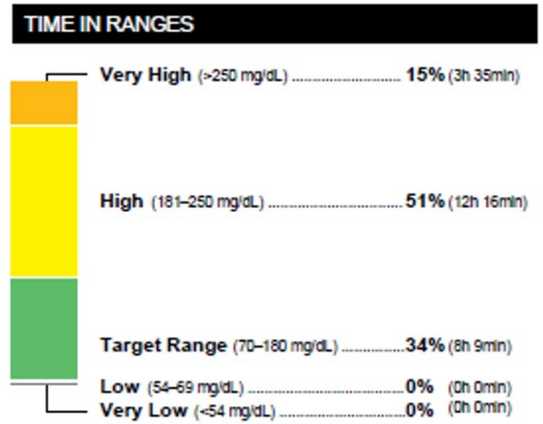

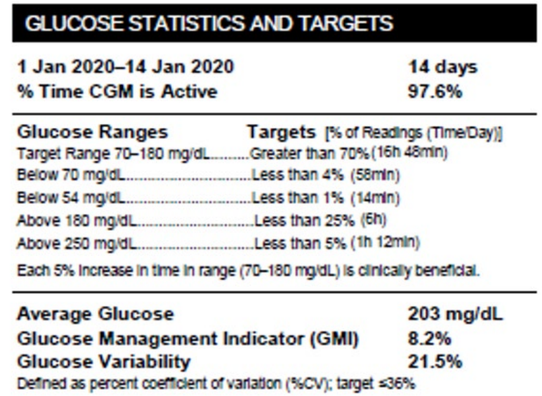

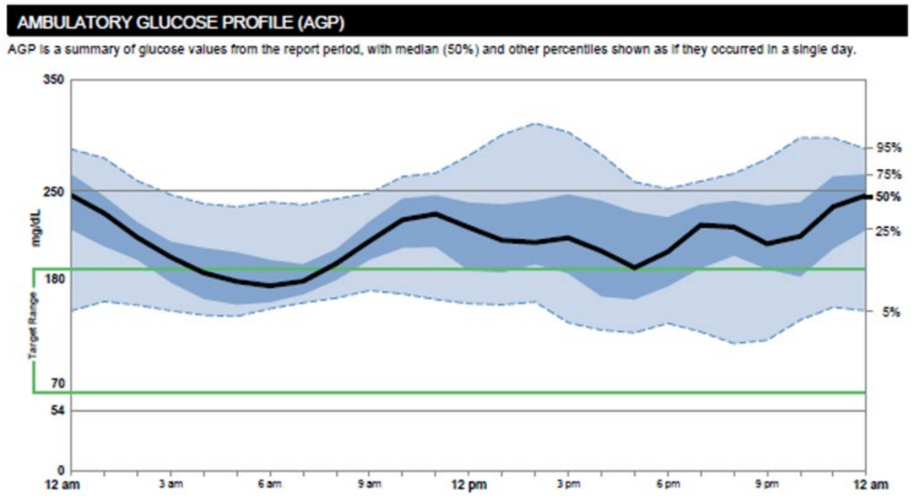

Questions?

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

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Case Study: Michael

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insulin degludec 85 units/day at bedtime
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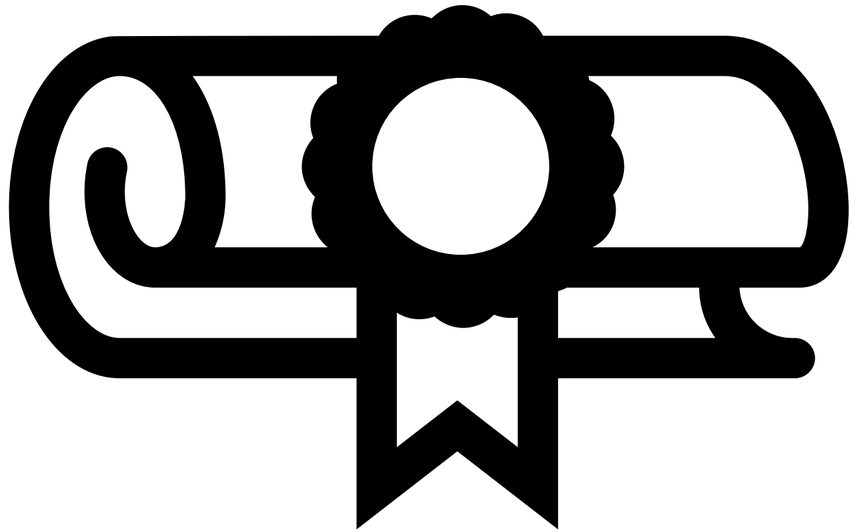

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