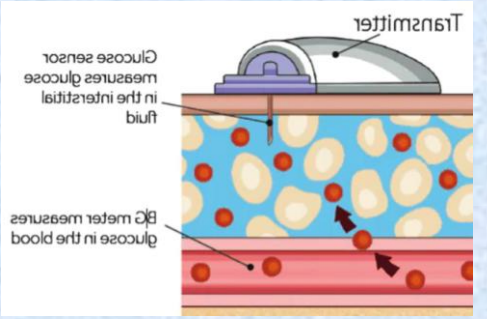
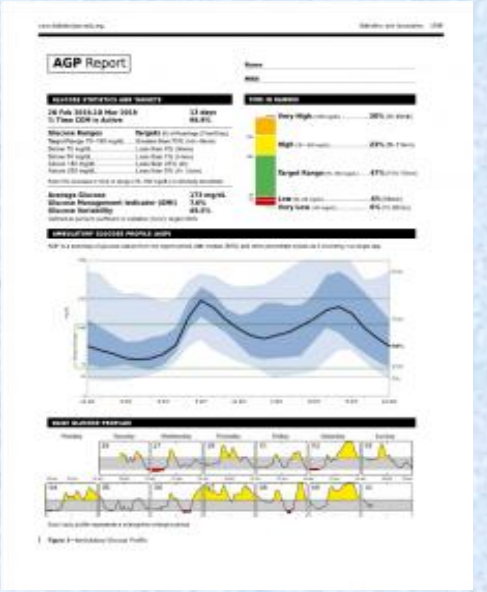
Diabetes Care in the Digital Era



Case Sharing: Application CGM in people living with T1D and T2D



Veronica HUNG (Diabetes Nurse Specialist)

12 Sep 2026

Case sharing

Background

Ms Lam, 58 yo, Dx T2D in 9/'21 by GP, at age 55, presented with weight loss over 10 kg in 3 months, polyuria and polydipsia, check blood, FBS: 16.6mmol/L, started Metformin 500mg OM and Diamicron 80mg OM and referred to GOPC

Lab results

Blood check at GOPC

HbA1c: 13.1%,

FBS: 12.6mmol/L,

R/LFT (N), eGFR 79,

Urine x ACR: ↑8.96 (RR <3.5) microalbuminuria

Medications

↑Metformin 500mg bd, ↑Diamicron 80mg bd and started Losartan 50mg daily

Challenge on Glycaemic control

Gradual ↑Diamicron 160mg bd, Metformin 1g bd, Actos 45mg daily but still worsening glycaemic control, persistent >10% and noted ↓BW

DATE	9/2021	1/2022	12/2022	3/2023	7/2023	11/2023
HbA1c	13.1% (Newly Dx DM) Started: Diamicron 80mg bd and Metformin (MF) 500mg bd	6.9%	12.0% Diamicron 120mg bd, MF 1g bd and Actos 30mg daily	12.5% Diamicron 160mg bd, Actos 45mg daily and MF 1g bd	12.8% Added Protaphane at bedtime on Diamicron 160mg bd, Actos 45mg daily MF 1g bd	13.1% **Splitted dose protaphane** and ↓Diamicron 80mg bd, ↓Actos 30mg daily, Keep MF 1g bd **Refer SOPC**

Gradual to max. dose Diamicron, Metformin and Actos in 1.5yrs

DATE	12/2021	3/2023	7/2023	8/2023	10/2023
BW (kg)	60.9	54.2	51.6	52.2	50.7

MG Diabetes Management

1st visit at MG

BW: 57.5kg, regain **bw** after on **2 doses of Protaphane**

SMBG: h'x profile shows not in under control

1) 3.6, 5.8-8.8
2) 4.1-12.2
3) 16-20.7
4) 10.7-17.0

Impression: Latent Autoimmune Diabetes in Adult (LADA) Check C-peptide,

2nd visit MG

BW: 56.4kg (stable) / BMI: 19.8

HbA1c 13.1% →8.1%, C peptide 0.04 ↓↓, insulin deficiency type diabetes

MG Management Plan

In view of c-peptide 0.04↓, compatible with insulin deficiency type of diabetes, HbA1c 13.1% (not on insulin)→8.4% (on 2 doses of insulin), normal RFT

Off Actos & Diamicron, keep Metformin 1g bd

started Basal Bolus regimen (MDI):

Tresiba 14units at bedtime, NovoRapid 4/6/6 units with meals

Arrange blood anti-GAD & Anit-IA2

Refer to DM nurse x insulin titration and DM education

Fu DM nurse

Assessment:

Patient feels stressed:

- 2 doses→4 doses of injection
- fear of hypos and esp. at fasting and midnight, (experience few episodes of hypos)
- worried DM-related complications (existing microalbuminuria) and
- no confident on glycaemic control with the new regimen

Plans:

Arrange Continuous glucose monitoring (CGM)

For patient expectations:

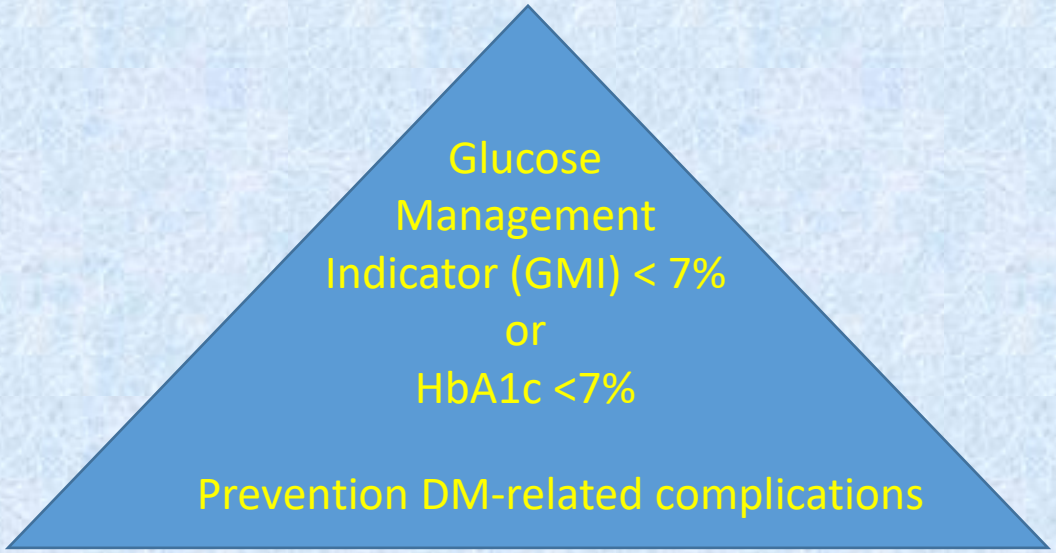
- prevention hypos,
- more detail information on glucose control
- how her glucose control under lifestyle (diet, physical activities, stress) and anti-diabetic medications, and
- the effectiveness of MDI on glycaemic control,
- Less finger prick

CGM on Healthcare Professional Perspective

Guidiance for Education, engagement patient on self-care diabetes management

Achievement on CGM Metric Targets

Target in Range (TIR) 3.9-10.0mmol/L **> 70%**



Avoid hypoglycaemia
Time Below Range (TBR) <3.9mmol/L < 4%

Time Above Range (TAR) >10.0mmol/L <25%
Glucose Variability (GV) $\leq$ 36%

AGP Report

Glucose Statistics and Target

Ambulatory Glucose Profile (AGP) 14 days

Daily Glucose Profiles

AGP Report

16 March 2024 - 29 March 2024 (14 Days)

LibreView

GLUCOSE STATISTICS AND TARGETS

~~16 March 2024 - 29 March 2024~~ ~~14 Days~~

Time sensor active: 96%

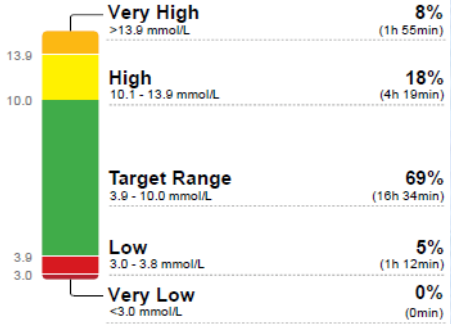
Ranges And Targets For	Type 1 or Type 2 Diabetes
Glucose Ranges	**Targets** % of Readings (Time/Day)
Target Range 3.9-10.0 mmol/L	Greater than 70% (16h 48min)
Below 3.9 mmol/L	Less than 4% (58min)
Below 3.0 mmol/L	Less than 1% (14min)
Above 10.0 mmol/L	Less than 25% (6h)
Above 13.9 mmol/L	Less than 5% (1h 12min)

Each 5% increase in time in range (3.9-10.0 mmol/L) is clinically beneficial.

Average Glucose	8.2 mmol/L
Glucose Management Indicator (GMI)	6.8% or 51 mmol/mol
Glucose Variability	42.8%

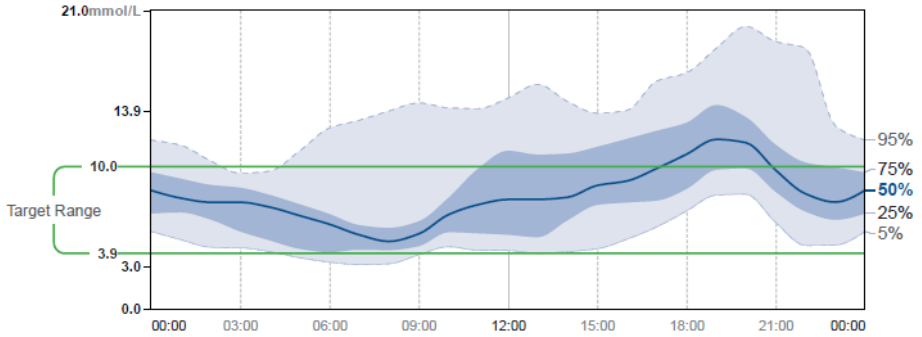
Defined as percent coefficient of variation (%CV); target ≤36%

TIME IN RANGES



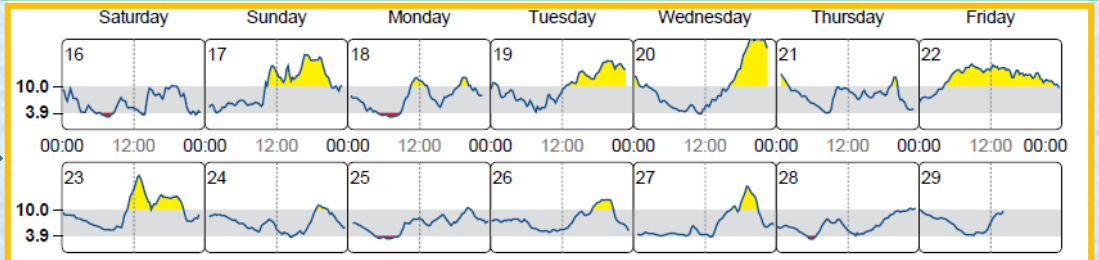
AMBULATORY GLUCOSE PROFILE (AGP)

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



DAILY GLUCOSE PROFILES

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



Source: Battelino, Tadej, et al. "Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations From the International Consensus on Time in Range." Diabetes Care, American Diabetes Association, 7 June 2019, https://doi.org/10.2337/dci19-0028.

Review patient's Ambulatory Glucose Profile (AGP) Report through Libreview

Period 16-29/3/'24 (14 days)

BW: 56.6kg (3/'24 before MDI)

→57.6kg

2hrpp' (3pm) 5.8mmol/L

No latest SMBG done

Glucose Lowering Drugs (GLD):

Tresiba 14units at bedtime,

NovoRapid 4/6/6units tds with meals Metformin 1g bd

CGM Metrics

DOB: 09/03/1966 DEVICE: FreeStyle LibreLink PHONE: 24868100 Generated: 16/04/2024

AGP Report

16 March 2024 - 29 March 2024 (14 Days)

LibreView

GLUCOSE STATISTICS AND TARGETS

16 March 2024 - 29 March 2024	1	14 Days
Time sensor active:	2	96%

Ranges And Targets For Type 1 or Type 2 Diabetes

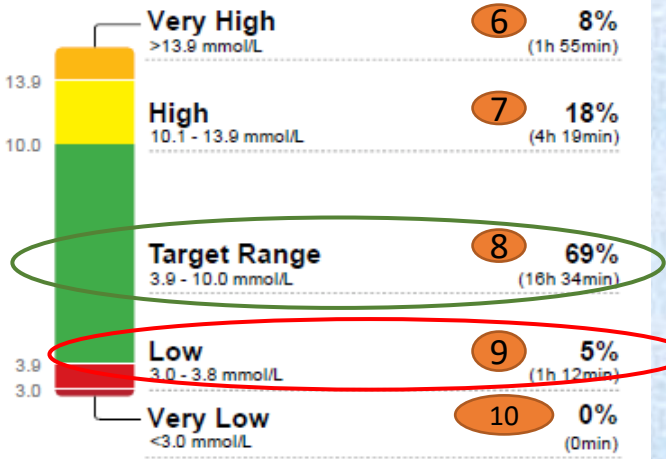
Glucose Ranges	Targets % of Readings (Time/Day)
Target Range 3.9-10.0 mmol/L	Greater than 70% (16h 48min)
Below 3.9 mmol/L	Less than 4% (58min)
Below 3.0 mmol/L	Less than 1% (14min)
Above 10.0 mmol/L	Less than 25% (6h)
Above 13.9 mmol/L	Less than 5% (1h 12min)

Each 5% increase in time in range (3.9-10.0 mmol/L) is clinically beneficial.

Average Glucose	3	8.2 mmol/L
Glucose Management Indicator (GMI)	4	6.8% or 51 mmol/mol
Glucose Variability	5	42.8%

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

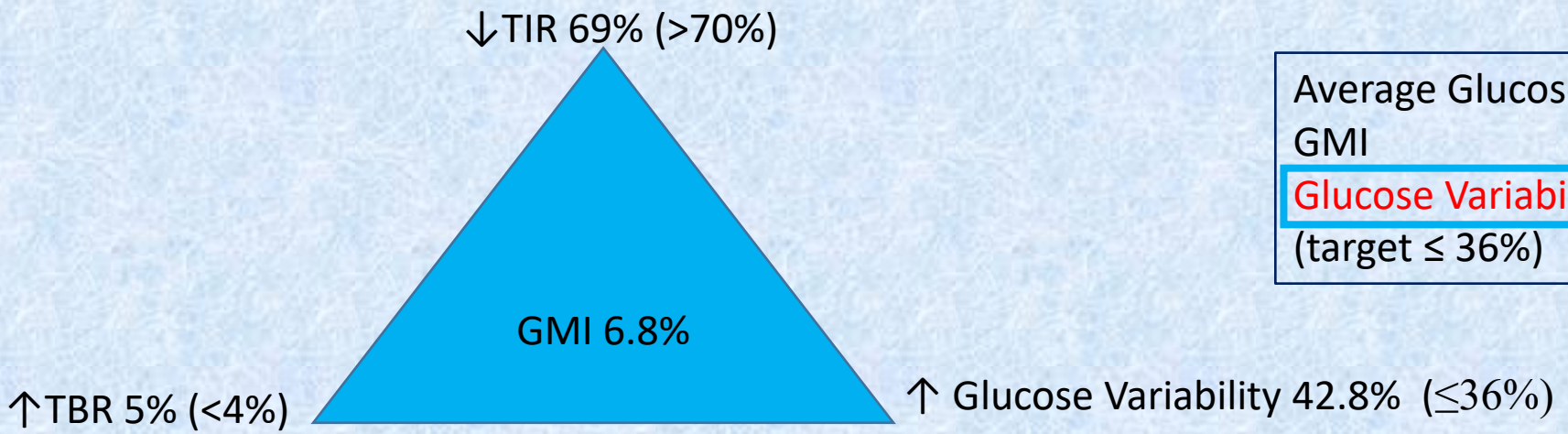
TIME IN RANGES



Where and what action plans

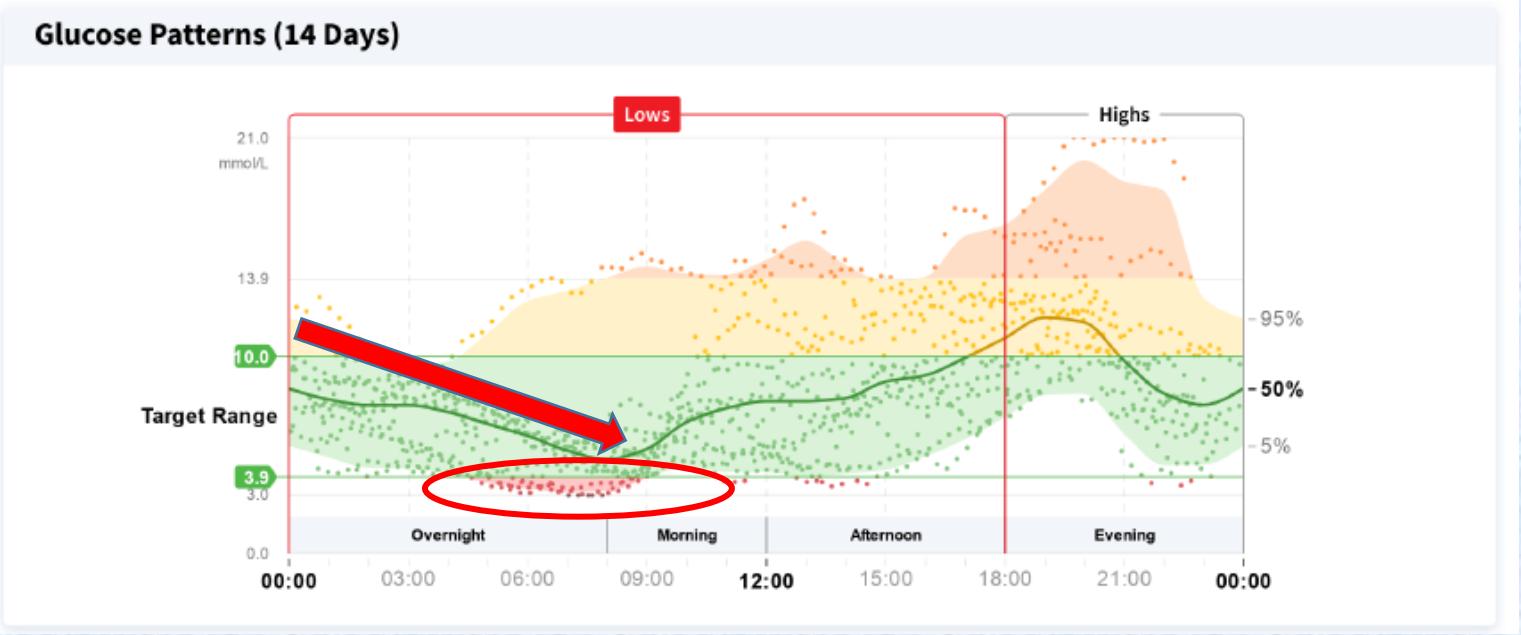
Look on the out range of CGM metrics

Very High	(>13.9)	8%
High	(11.1-13.9)	18%
Target Range	(3.9-10.0)	69%
Low	(3.0-3.8)	5%
Very Low	(<3.0)	0%

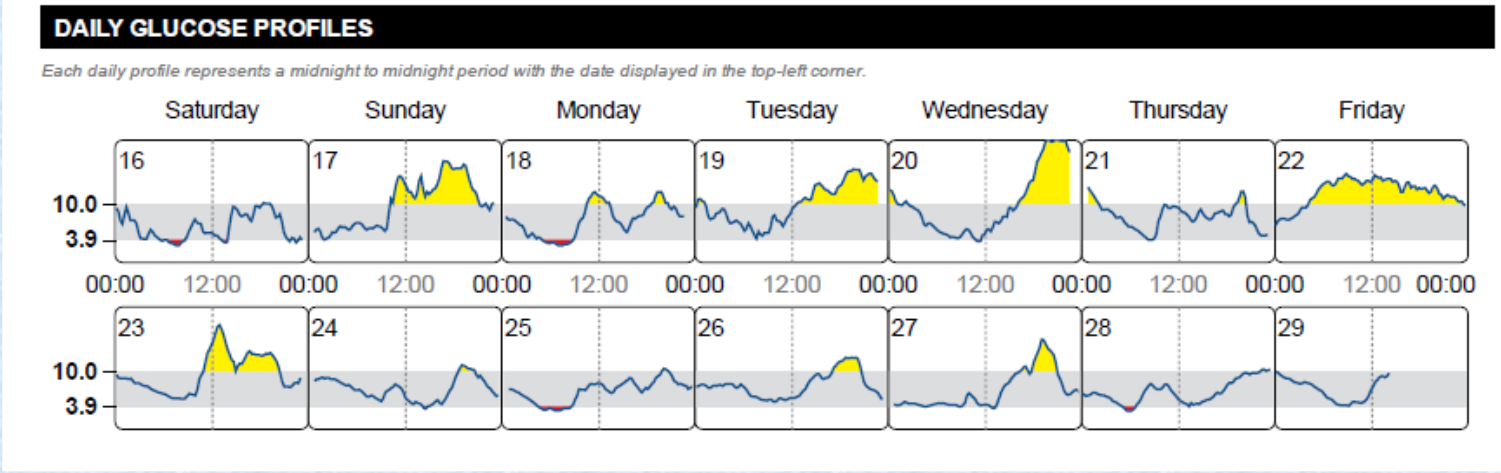


Average Glucose	8.2mmol/L
GMI	6.8%
Glucose Variability	42.8%
(target ≤ 36%)	

Step 1



Hypos: 2.9-3.8mmol/L, occasionally patient complaint hungry feeling



Prevention of HYPOS

Fasting glucose median dipped to below hypos threshold, bedtime (7.2-20.9 mmol/L)

No night snack at bedtime

Assessment on behavior :

- No SMBG done during the period CGM in 14 days, claimed CGM replace SMBG and avoid needle pain for 14 consecutive days and save money for the glucose strips!
- No confirmation on hypos even hypos feeling on low sensor glucose (SG), mild hypos feeling : hunger
- Not take simple glucose to treat hypos, eat regular b'fast instead

Action Plans 1:

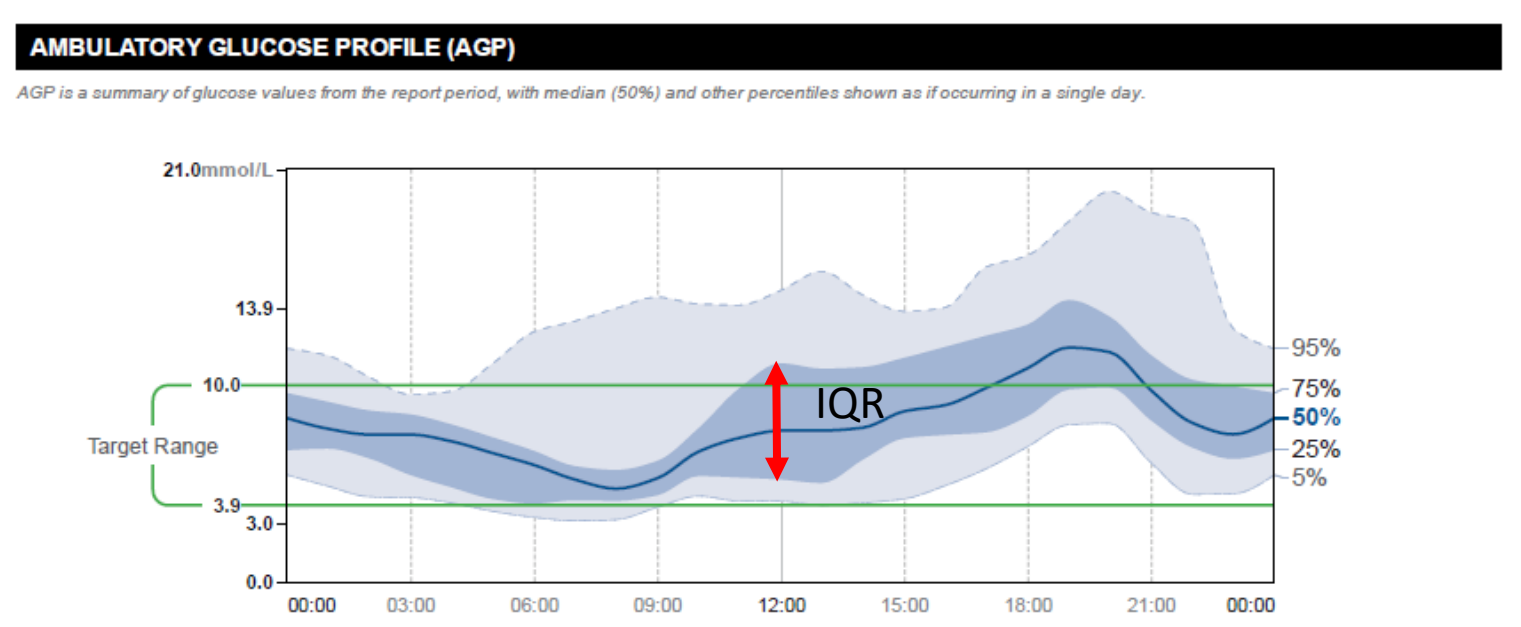
Teach to

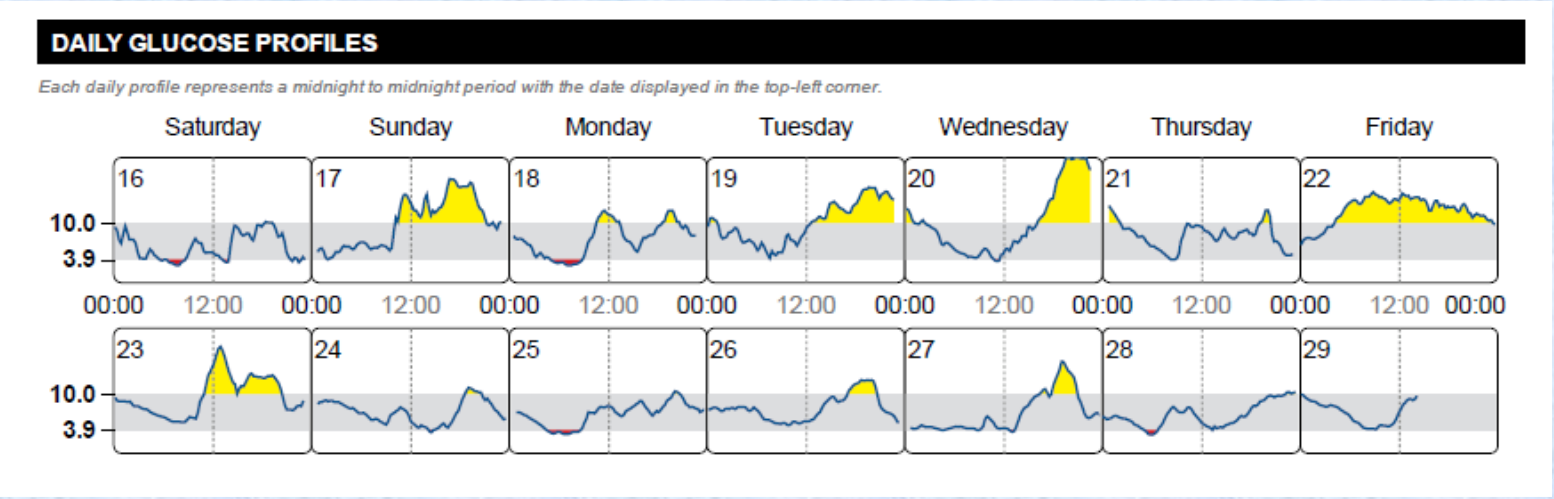
- confirm hypos with h'x, CGM cannot total replace CBG esp. at hypos
- proper hypos management,

Rx plans:

- ↓Tresiba 14→12units at bedtime to
- prevent hypos which patient is most worried

Step 2





Look at the target glycaemic control

Target TIR > 70%

Very High	(>13.9)	8%
High	(11.1-13.9)	18%
Target Range	(3.9-10.0)	69%
Low	(3.0-3.8)	5%
Very Low	(<3.0)	0%

For IQR showed **the wide dark blue** may reflect insufficient prandial insulin to cover for meal, esp. for the lunch and bring extent to predinner glucose excursion.

Behavioural Problem:

Patient admitted most post lunch excursion **during eating out** and omission insulin or delay injection, not bring insulin out as fear of hot weather affect insulin

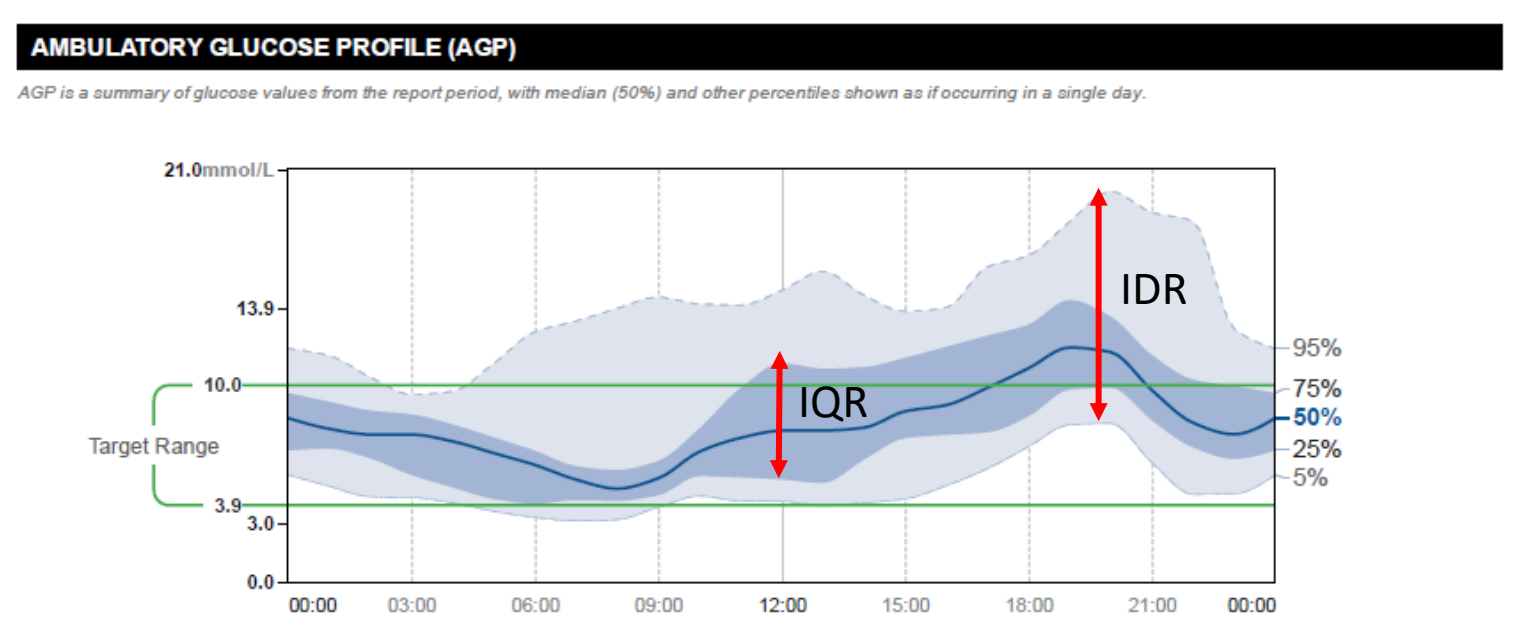
Actions Plans 2:

Reinforcement on insulin adherence, suggest to put insulin pen inside the aluminium small bag

not disturb her social life

Step 3

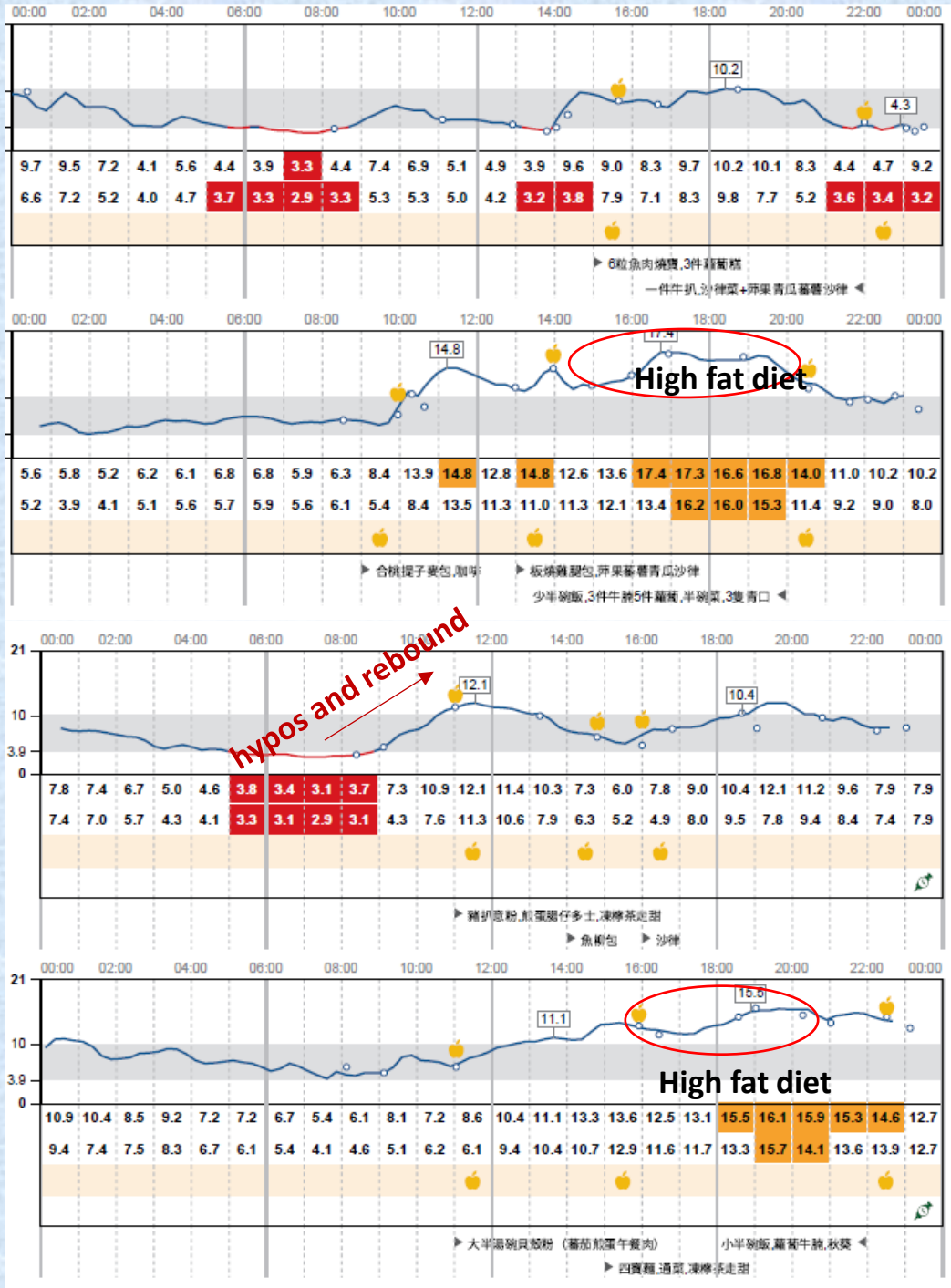
Glucose Variability (inter and intra-day)

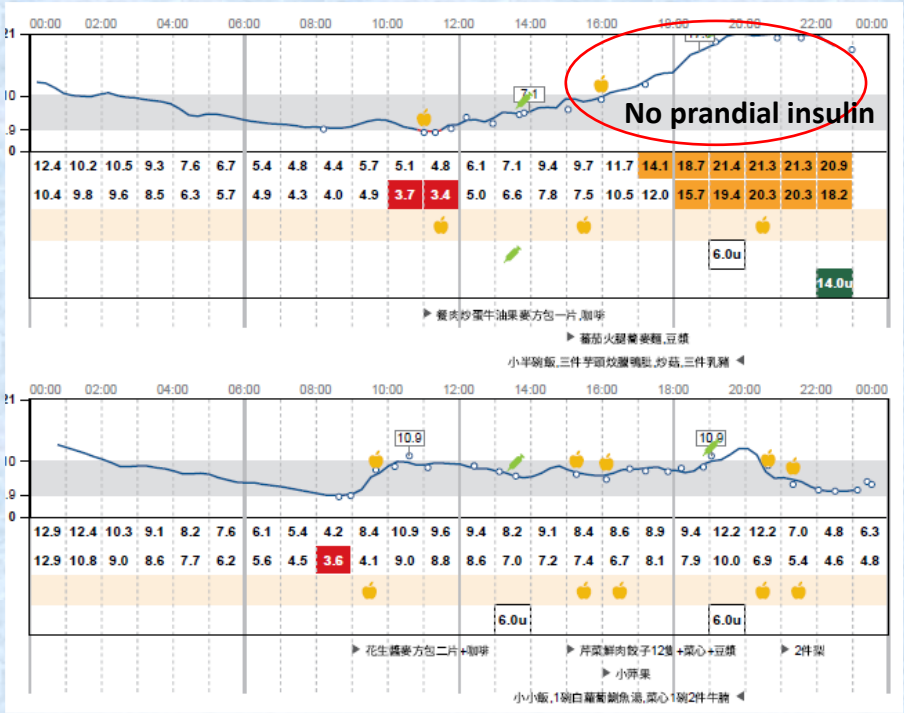


Average Glucose	8.2mmol/L
GMI	6.8%
Glucose Variability	42.8%
(target ≤ 36%)	

AGP shows two fluctuation ranges

Noted wide range of IQR (dark blue) and IDR (light blue)





Inter days glucose variability related to

- dietary and insulin adherence
- hypo and rebound at fasting

Plans:
Reinforcement to input daily activities onto the smartphone for more detailed activities

Lifestyle enhancement
Adhere mealtime insulin, even back home to inject back ASAP

If on high fat food, inject rapid-acting insulin post meal (~30mins)

Teach CHO counting and refer to dietitian

Summary on DM nurse education and planning

Reinforcement on lifestyle modification, mealtime insulin adherence

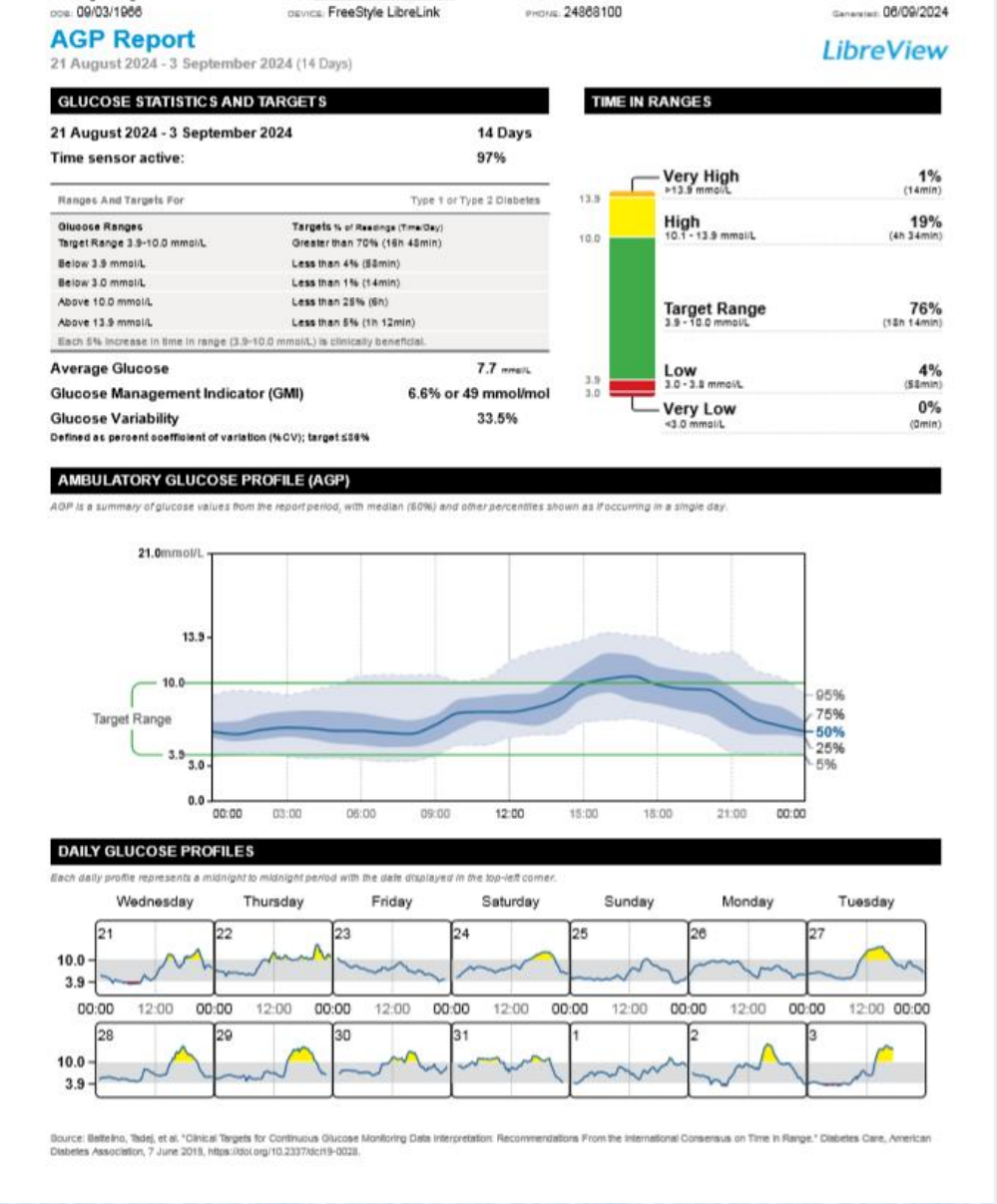
Agree for SFI Libre for continuous AGP, but only afford before clinic Fu

Follow next HbA1c and AGP, await the anti-islet antibodies

Explaint her low level of c-peptide indicated insulin deficiency type of diabetes and need long-term insulin therapy esp. Long-acting insulin for survival, rapid-acting insulin to cover meals

Teach sick day management

↓Bedtime Tresiba 12units and keep NovoRapid



DOB: 09/03/1966 DEVICE: FreeStyle LibreLink PHONE: 24868100 Generated: 06/09/2024

AGP Report

21 August 2024 - 3 September 2024 (14 Days)

LibreView

GLUCOSE STATISTICS AND TARGETS

21 August 2024 - 3 September 2024	14 Days
Time sensor active:	97%

Ranges And Targets For	Type 1 or Type 2 Diabetes
Glucose Ranges	**Targets % of Readings (Time/Day)**
Target Range 3.9-10.0 mmol/L	Greater than 70% (16h 48min)
Below 3.9 mmol/L	Less than 4% (58min)
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Above 10.0 mmol/L	Less than 25% (6h)
Above 13.9 mmol/L	Less than 5% (1h 12min)

Each 5% increase in time in range (3.9-10.0 mmol/L) is clinically beneficial.

Average Glucose	7.7 mmol/L
Glucose Management Indicator (GMI)	6.6% or 49 mmol/mol
Glucose Variability	33.5%

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

TIME IN RANGES

Very High	>13.9 mmol/L	1% (14min)
High	10.1 - 13.9 mmol/L	19% (4h 34min)
Target Range	3.9 - 10.0 mmol/L	76% (18h 14min)
Low	3.0 - 3.8 mmol/L	4% (58min)
Very Low	<3.0 mmol/L	0% (0min)

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.

DAILY GLUCOSE PROFILES

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

Source: Battelino, Tadej, et al. "Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations From the International Consensus on Time in Range." Diabetes Care, American Diabetes Association, 7 June 2019, https://doi.org/10.2337/dci19-0028.

Reviewed 2nd AGP Report

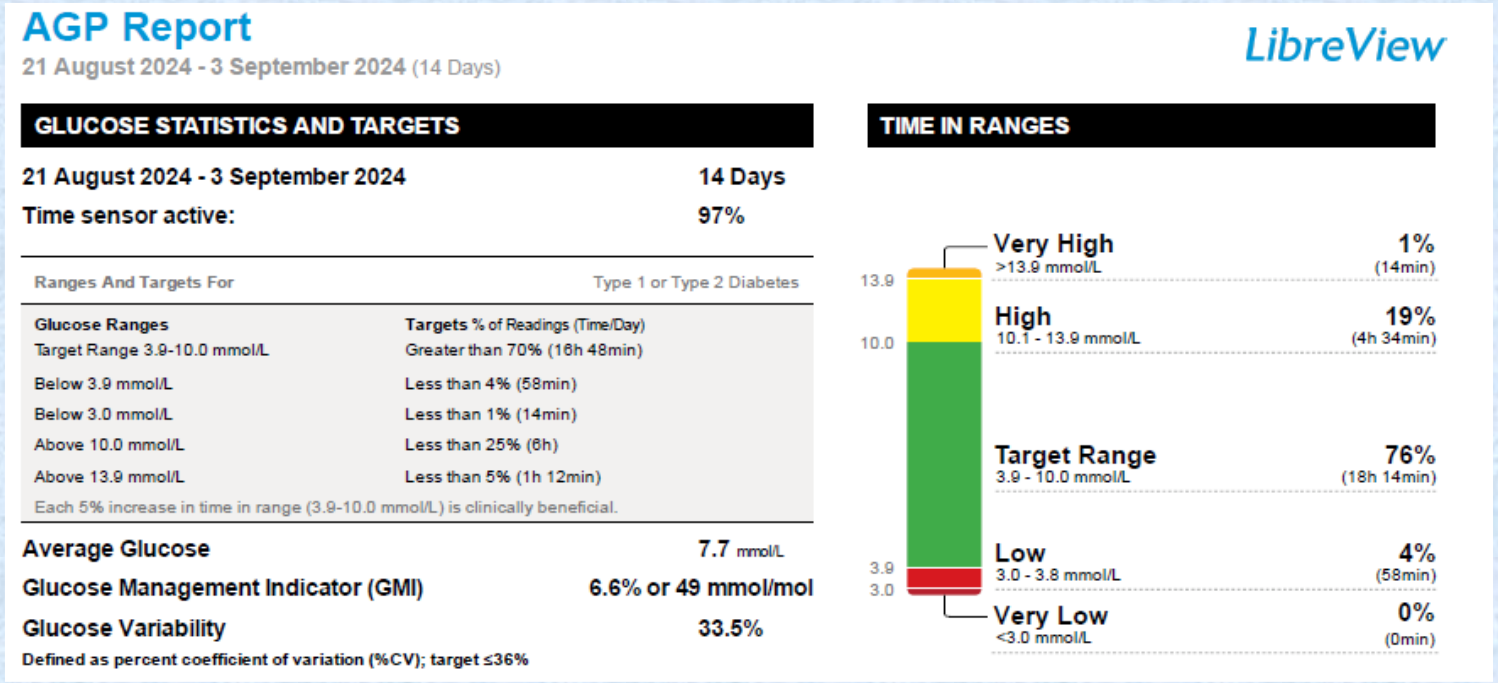
Fu DM nurse on 6/9/'24, review patient's Ambulatory Glucose Profile (AGP) 21/8-3/9/'24 (14 days)

BW: 56.6kg (3/'24 before MDI)→58.3kg (9/'24)
HbA1c 8.4% (3/'24 before MDI)→7.5% (9/'24)

Anti-islet cell antibodies (5/6/'24):
Anit-GAD 65 >2000.0 (RR <10)
Anit-IA2 >4000.0 (RR <10)
Cpeptide < 0.04 ↓
Compatible LADA

MRAM done in 6/'24: mostly uneventful
Urine x ACR: N

Glucose Lowering Drugs:
Tresiba 12units at bedtime,
NovoRapid 4/6/6units tds with meals
Metformin 1g bd



AGP Report

21 August 2024 - 3 September 2024 (14 Days)

LibreView

GLUCOSE STATISTICS AND TARGETS

21 August 2024 - 3 September 2024	14 Days
Time sensor active:	97%

Ranges And Targets For	Type 1 or Type 2 Diabetes
Glucose Ranges	**Targets** % of Readings (Time/Day)
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Glucose Management Indicator (GMI)	**6.6% or 49 mmol/mol**
Glucose Variability	**33.5%**

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

TIME IN RANGES

13.9
10.0
3.9
3.0

Very High	>13.9 mmol/L	1% (14min)
High	10.1 - 13.9 mmol/L	19% (4h 34min)
Target Range	3.9 - 10.0 mmol/L	76% (18h 14min)
Low	3.0 - 3.8 mmol/L	4% (58min)
Very Low	<3.0 mmol/L	0% (0min)

AGP metrics

Very High	(>13.9)	1% ← 8%
High	(11.1-13.9)	19% ← 18%
Target Range	(3.9-10.0)	76% ← 69%
Low	(3.0-3.8)	4% ← 5%
Very Low	(<3.0)	0% ← 0%

Average Glucose	7.7 ← 8.2mmol/L
GMI	6.6% ← 6.8%
Glucose Variability (target ≤ 36%)	33.5% ← 42.8%

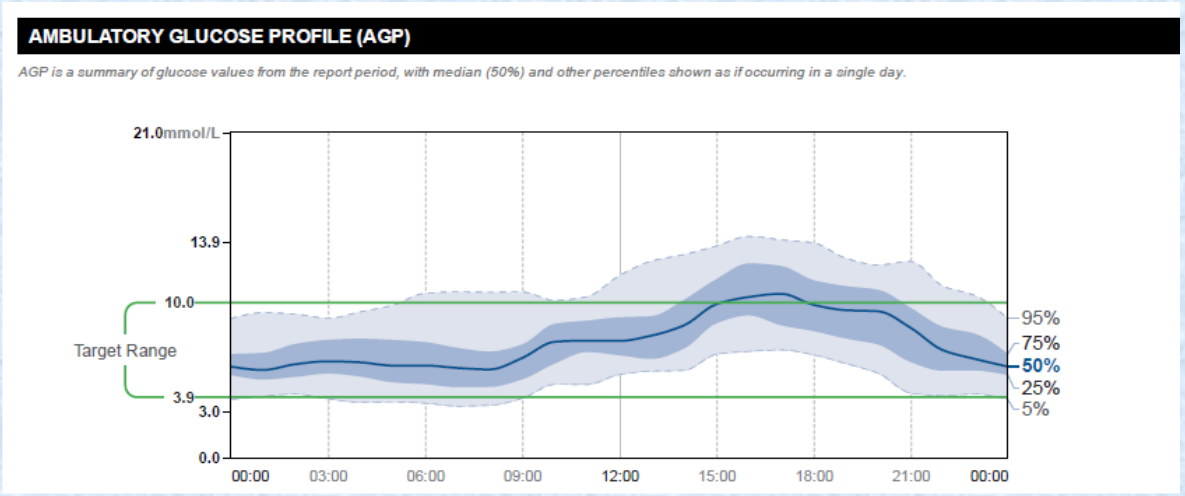
TIR 76% (>70%)

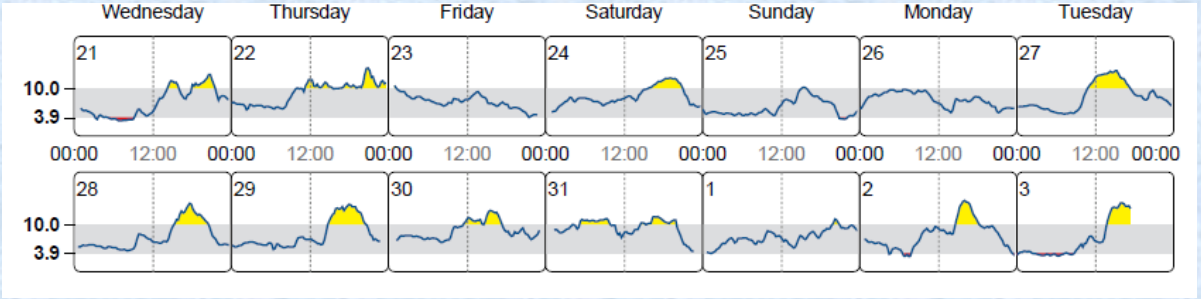
GMI 6.6%
HbA1c 7.5%
MRAM done
Urine ACR (N)

TBR 4% (<4%)

Glucose variability 33.5% (≤ 36%)







Reviewed AGP

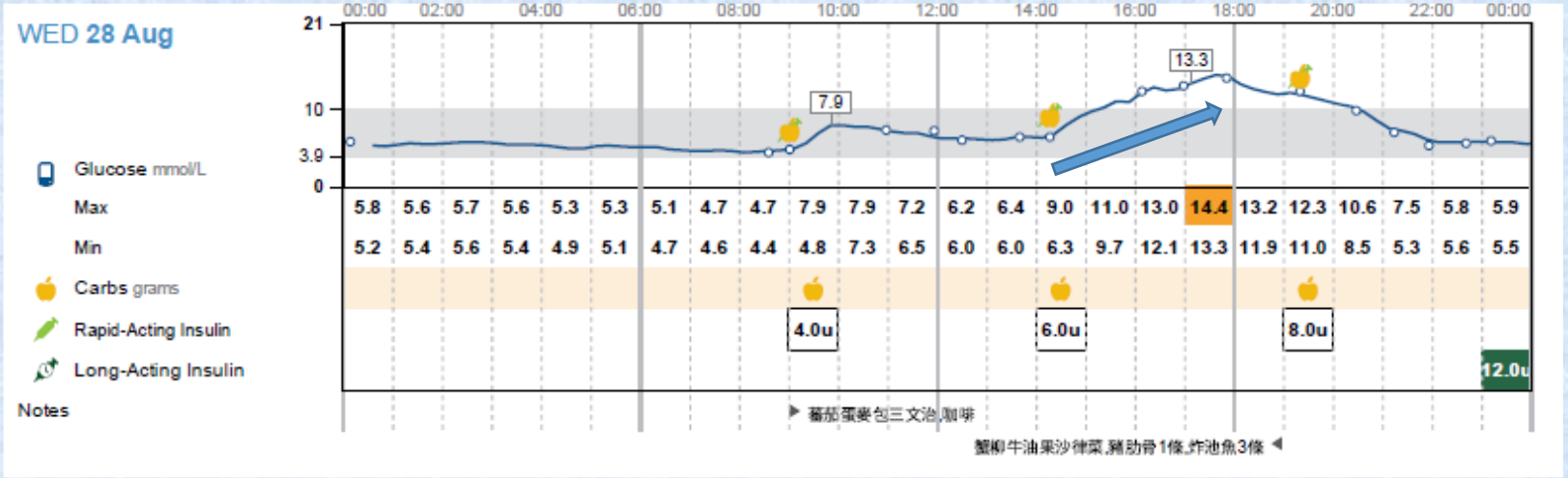
- Still glucose excursion esp. post lunch
- Noted hypos data at fasting (3.2-3.8mmol/L) but
- Overnight the median line is flat and stable

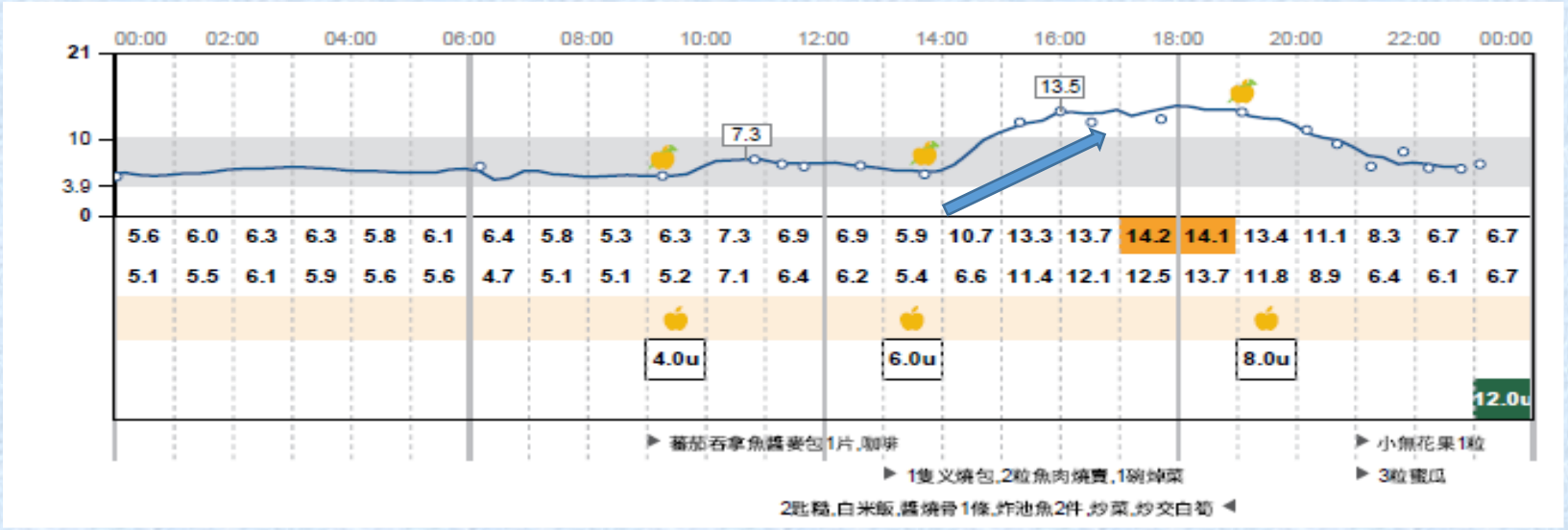
Determine where action is needed

For more green and

less yellow & less red

Let's start assessment and focus education





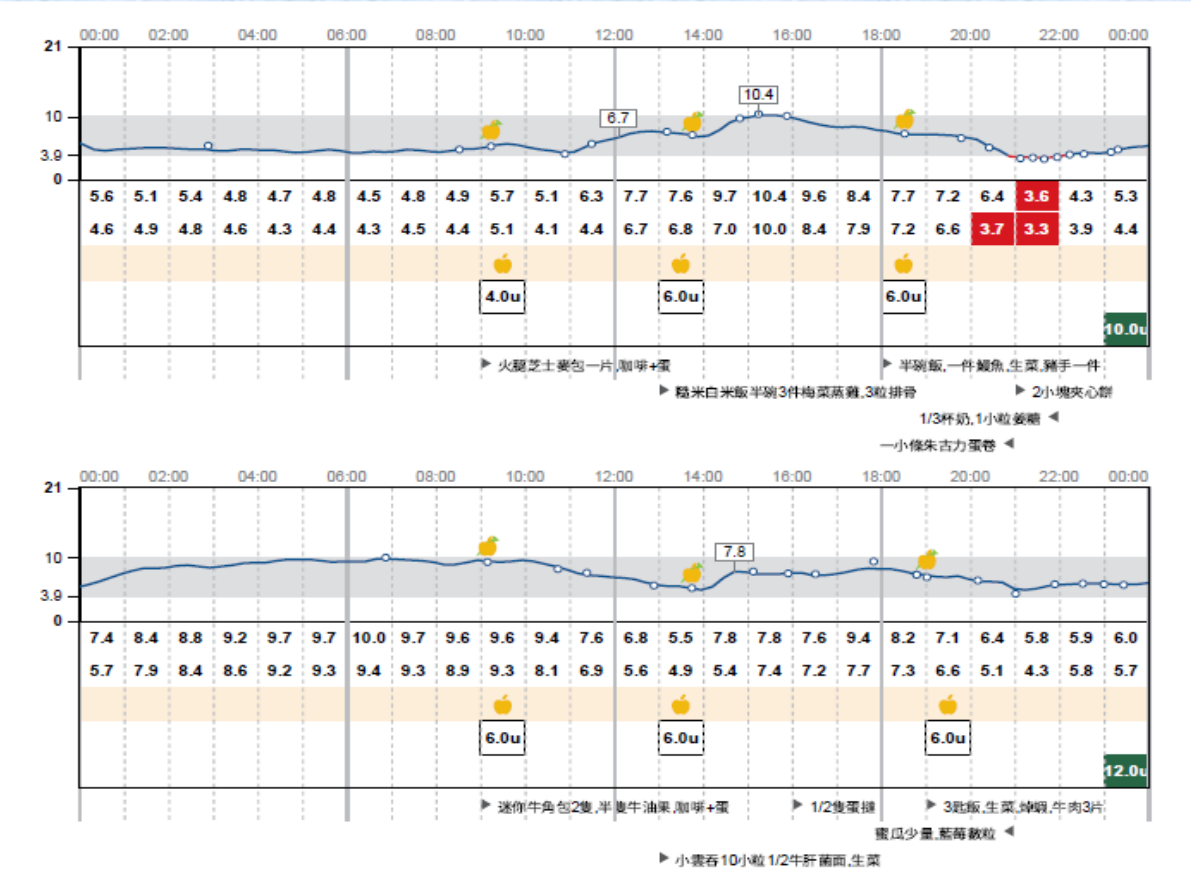
Step 1
Post lunch glucose excursion

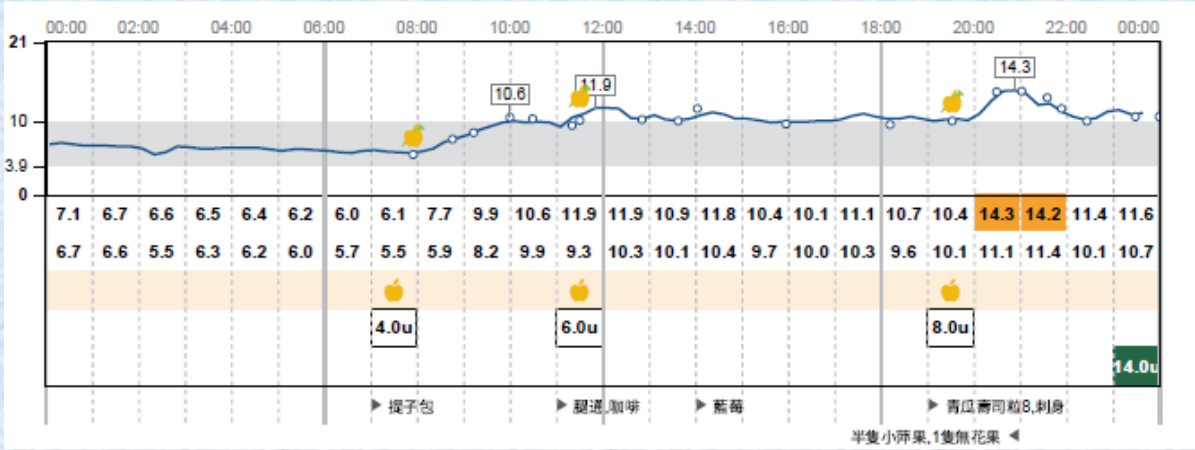
Bebaviour assessment

Noted mostly post lunch glucose excursion extended to dinner time may be related to eating out and at dinner ↑self increase rapid-acting insulin at dinner time 6→8 and cause post dinner glucose dip sharply

Educations and actions:

Teach CHO counting
If on high fat food, may inject post meal due to delay CHO absorption
Teach correction dose before meals





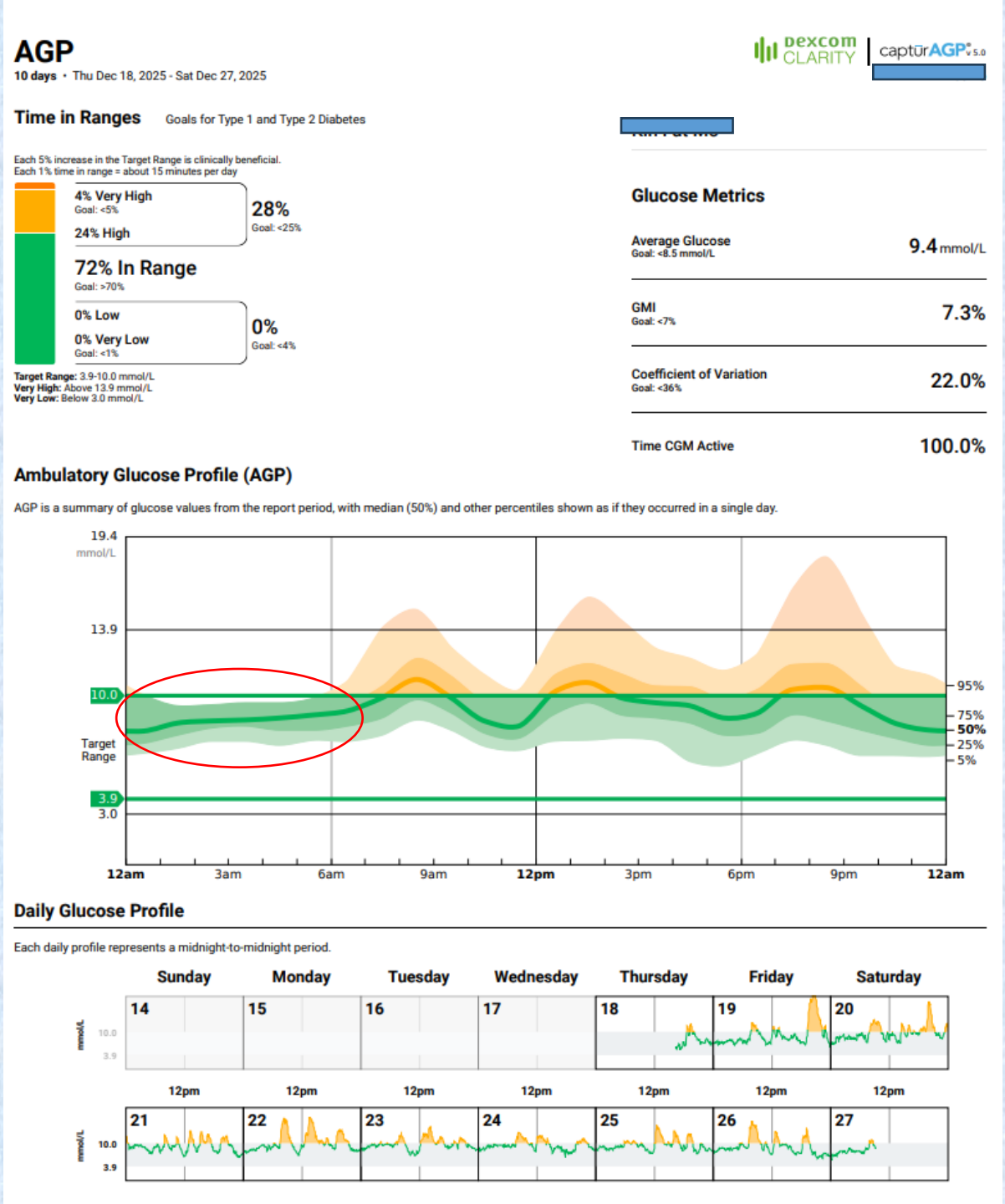
Step 2
Overnight glucose stability and hypos

Bebaviour assessment

For the bedtime insulin self adjusted 10 - 14units depends on bedtime sensor glucose

Educations and actions:

Suggest not to self adjust bedtime ultra-long acting Tresiba frequently as cannot show the effect next day



M/59, T2D since 2005, complicated by PDMR, Fu eye with multiple courses of laser at both eyes, now stable and vision is satisfactory. HbA1c 7.5%→7.7%, complaint hypos symptoms, no SMBG done, needle phobia, accept injectable therapy
Refer for CGM

PMHx:
Obese, BMI: 27.8

On current anti-diabetic medications over 2 years
Metformin 1g bd
Actos 30mg daily
Dapagliflozin 10mg daily
Ozempic 1mg once weekly (injected by wife also DM on insulin injection)

Social Hx:
Live with wife, no children
Managerial work at logistic company, on regular hour (5 days work)
Limited exercise, BMI:27.8

Diet pattern:
Mainly 3 meals, eat out, seldom self cook

Plans:

- **Lifestyle modifications**
- **Discuss basal insulin for better fasting glucose profile**


thank you