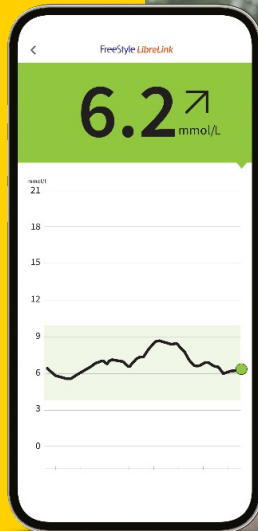




FreeStyle  
Libre 2

# Case study: Matthew

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Case study



# Case study: Matthew

<b>Age</b>	11	<b>BMI</b>	17.3 kg/m <sup>2</sup>
<b>Diabetes (Type)</b>	Type 1 diabetes	<b>Last HbA1c value</b>	68.0 mmol/mol (8.4%)
<b>Profession</b>	High-school student	<b>Target glucose range</b>	3.9–10 mmol/L
<b>Duration of diabetes</b>	9 years	<b>Treatment</b>	Basal-bolus insulin therapy



## Summary

Matthew wants to be a normal kid who goes to school and hang out with his friends. He is struggling to accept the need to manage his Type 1 diabetes and is poorly compliant with his insulin therapy.



## Comorbidities

Matthew also experiences anxiety about living with Type 1 diabetes.



## Specific objective

Improve Matthew's engagement with his diabetes and achieve some steps towards better glycaemic control.

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For children aged 4-12, a caregiver at least 18 years old is responsible for supervising, managing, and assisting them in using the FreeStyle Libre system and interpreting its readings.

# Case study: Matthew

## AGP Report

30 March 2021 - 12 April 2021 (14 Days)

LibreView

### GLUCOSE STATISTICS AND TARGETS

30 March 2021 - 12 April 2021 14 Days  
 % Time Sensor is Active 94%

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.	

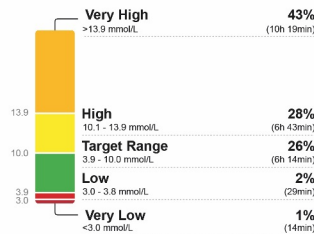
Average Glucose 13.6 mmol/L

Glucose Management Indicator (GMI) 10.1% or 87 mmol/mol

Glucose Variability 55.3%

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

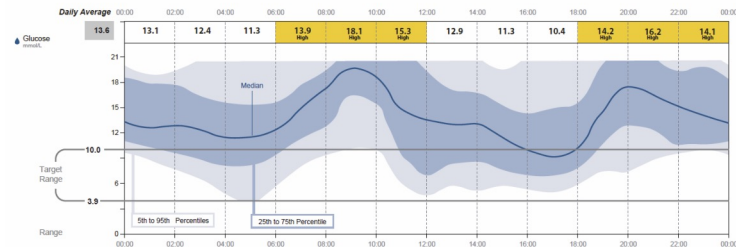
### TIME IN RANGES



## Daily Patterns

30 March 2021 - 12 April 2021 (14 Days)

LibreView



Images are for illustrative purposes only. Not actual patient data.

## Snapshot

30 March 2021 - 12 April 2021 (14 Days)

LibreView

### Glucose

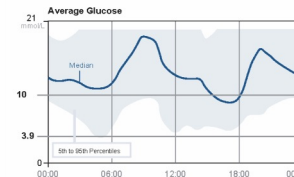
GMI 10.1 % or 87 mmol/mol

AVERAGE GLUCOSE 13.6 mmol/L

% above target 71 %

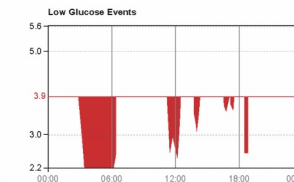
% in target 26 %

% below target 3 %



LOW GLUCOSE EVENTS 8

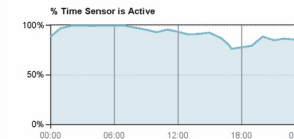
Average duration 77 min



### Sensor Usage

% TIME SENSOR IS ACTIVE 94 %

Average scans/Views 8 / Day



# What does the 4-step review tell us?

## STEP 1

### Data capture and Time in Range (TIR)

Despite his poor compliance, Matthew has been scanning regularly and has collected 94% of sensor data that can be analysed in an AGP. HE deserves praise for this effort. His Time in Range is only 26%, which is a concern.

## STEP 2

### Look for patterns of hypoglycaemia

Matthew's AGP shows a very high degree of variability in the blue and grey shaded bands between 3:00am–6:00am and also from 11:00am–6:00pm, with his grey band straying close to the bottom of his target glucose range during both periods. Although he is experiencing few low glucose events, these clearly drop below 3.0 mmol/L. This creates a risk of nocturnal and daytime hypoglycaemia that needs to be managed.

## STEP 3

### Look for patterns of hyperglycaemia

A notable feature of Matthew's AGP is that his average glucose, as traced by the median line, is above his target glucose range throughout the day and night, as are most of his readings. By looking at his **Daily Patterns report**, it is clear that his average glucose levels are very high across the day, with peaks averaging 18.1 mmol/L after breakfast. He is also experiencing a large excursion after his evening meal. 71% of his readings are above target, the majority of which are above 13.9 mmol/L. This chronic hyperglycaemia is a concern.

## STEP 4

### Look for patterns of glucose variability

The blue and grey bands in Matthew's AGP are billowing throughout the whole day, indicating he has a combination of issues, both with managing his insulin treatment and with his behaviour and daily routines. His glucose is unstable across the day, with a CV of 55.3%, and his median line is on a rollercoaster, with significant excursions associated with morning and evening meals. These can be a focus for better management and an improved Time in Range performance, which is currently only 26%.

### What actions might you agree with Matthew?

- A discussion regarding Matthew's compliance is warranted, as well as to pinpoint aspects of his behaviour and routines, especially those that may contribute to the chance of low glucose overnight.
- Matthew's basal insulin rate can be increased to try and bring his overall daily control towards his target glucose range and improve his Time in Range. There is a lot of air under the clouds, so this may be achieved without additional risk of hypoglycaemia.
- He should also increase his morning and evening prandial insulin doses to moderate his mealtime excursions.

# Case study: Matthew



## AGP Report

20 June 2021 - 3 July 2021 (14 Days)

### GLUCOSE STATISTICS AND TARGETS

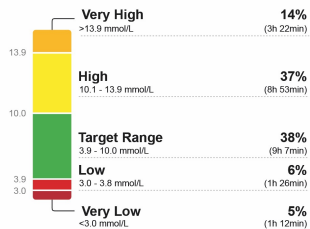
20 June 2021 - 3 July 2021 **14 Days**  
 % Time Sensor is Active **79%**

Ranges And Targets For		Type 1 or Type 2 Diabetes
<b>Glucose Ranges</b>		<b>Targets % of Readings (Time/Day)</b>
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** **10.7** mmol/L  
**Glucose Management Indicator (GMI)** **8.3% or 67** mmol/mol  
**Glucose Variability** **47.3%**  
 Defined as percent coefficient of variation (%CV); target ≤36%

## LibreView

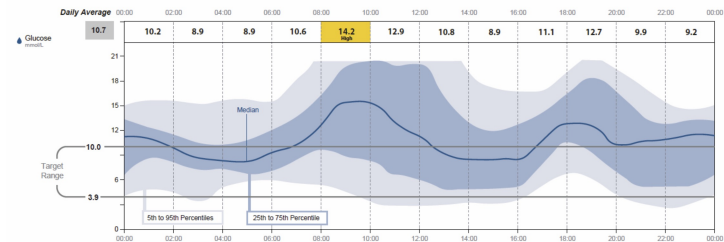
### TIME IN RANGES



## Daily Patterns

20 June 2021 - 3 July 2021 (4 Days)

## LibreView



Images are for illustrative purposes only. Not actual patient data.

## Snapshot

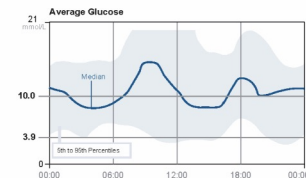
20 June 2021 - 3 July 2021 (14 Days)

## LibreView

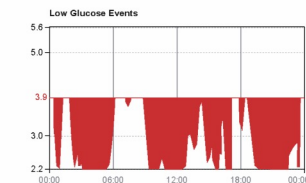
### Glucose

GMI **8.3%** or **67** mmol/mol

**AVERAGE GLUCOSE** **10.7** mmol/L  
 % above target **51%**  
 % in target **38%**  
 % below target **11%**

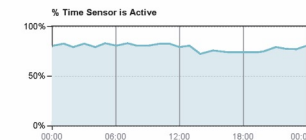


**LOW GLUCOSE EVENTS** **18**  
 Average duration **112** min



### Sensor Usage

**% TIME SENSOR IS ACTIVE** **79%**  
 Average scans/Views **7 / Day**



# What does the 4-step review tell us?

## STEP 1

### Data capture and Time in Range (TIR)

Matthew's Time in Range has improved from 26% to 38%, which is a good step in the right direction! His data capture has reduced to 79%, which is still above the threshold for a confident review of his AGP data.

## STEP 2

### Look for patterns of hypoglycaemia

The changes to Matthew's treatment have increased his frequency of readings below 3.9 mmol/L from 3% to 11%, including 5% of readings below 3.0 mmol/L. His Snapshot report is showing low glucose events at many points overnight and through the day. This is a concern and should be a priority for attention.

## STEP 3

### Look for patterns of hyperglycaemia

Matthew's Time in Range has reduced substantially to 51% of readings, with only 14% above 13.9 mmol/L. He is still seeing a consistent large excursion after breakfast, but the average glucose shown in his **Daily Patterns report** at this point is 14.2 mmol/L compared to 18.1 mmol/L. The glucose excursion after his evening meal is also considerably reduced. His Time in Range has consequently improved to 38%. Overall, Matthew has made good progress, but his consistent high glucose levels are still a concern.

## STEP 4

### Look for patterns of glucose variability

The blue and grey bands in Matthew's AGP are still ballooning throughout the day, indicating he is still struggling with managing his insulin treatment and his daily routines. Variability in his blue band is improved overnight, which is a good outcome, contributing to his improved time in range, but it is still very wide throughout the rest of the day, as is his grey band. The poor stability, shown by his fluctuating median line and CV of 47.3%, is cause for concern in the context of his adherence with therapy and his daily routines. His mealtime glucose excursions can be a focus for management.

### What actions might you agree with Matthew?

- Matthew's basal insulin rate again needs to be reduced to manage his risk of hypoglycaemia.
- He is recommended again to increase his morning and evening prandial insulin doses and/or timings to further moderate his mealtime excursions. A discussion regarding Matthew's mealtime habits and diet may help here.
- Matthew is also recommended to focus on correction boluses during his school day, whenever he sees his glucose is high in the morning and afternoon, or his Trend Arrows are indicating rising glucose above target.