Type 1 Diabetes

Sick Day and Trend Management Virtual Class

Sick day Management

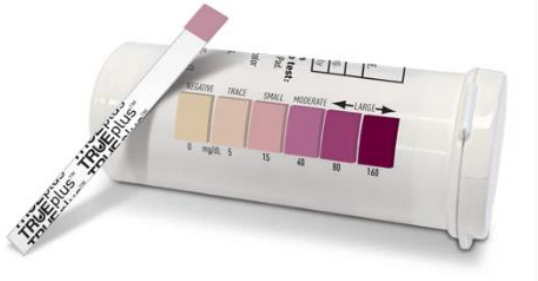
What will you learn ?

- What to do when your child is sick
- How illness may affect your child’s blood sugar control
- What ketones are and when to test
- How to manage your child’s hydration
- When to call the diabetes team or pediatrician

When your child is sick…

Knowing your child is sick

- Symptoms of illness: fever, vomiting, diarrhea, severe headache, earache, sore throat, coughing, sneezing or injury



Supplies to have on hand

- Urine ketone strips
- Glucagon emergency kit (set expiration date reminders in your cell phone)
- Extra blood sugar test strips (you'll need to double check your sensor)
- Fluids with and without sugar

How blood sugars are affected during illness

- Blood sugars can be high (fevers and infections) or low (stomach bugs)
- Do not rely on sensor readings alone
- Young children do not have the ability to store much glucose in the body and their blood sugar may run lower during illness
- Stress hormones from illness may make the blood sugar rise
- Your child <u>needs insulin every day</u> to use sugar in blood even when unable to eat, so never skip Lantus.

Expect Glucose to Run High and Low

- **If blood sugar is elevated**: Check blood sugar every 2-3 hours, give correction boluses and check for ketones if hovering over 300mg/dl. ***Remember do not give correction boluses any closer than every 2 hours.***
- **If blood sugar is below 70:** follow the 'Rule of 15' and check for ketones. Having simple carbs handy, like regular soda, popsicles, or glucose gel will help keep your blood glucose up if you are at risk for lows.

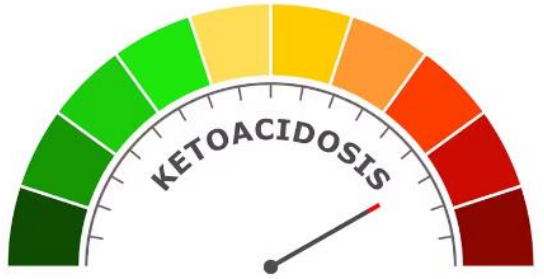
Making sure your blood glucose remains in target is one of the best ways to help your body deal with illness.

Understanding Ketones

Ketosis

- Ketones are produced because there is not enough insulin in the body
- Ketones are acids made when fat and muscle is burned for energy instead of sugar
- Ketones may cause increased thirst, vomiting, nausea, or abdominal pain
- Ketones may be managed at home with insulin, fluids, and frequent telephone contact with the diabetes team
- Insulin stops ketone production and increasing fluids help clear them from the body
- More insulin is needed if ketones are moderate or large. Please refer to dosing chart.

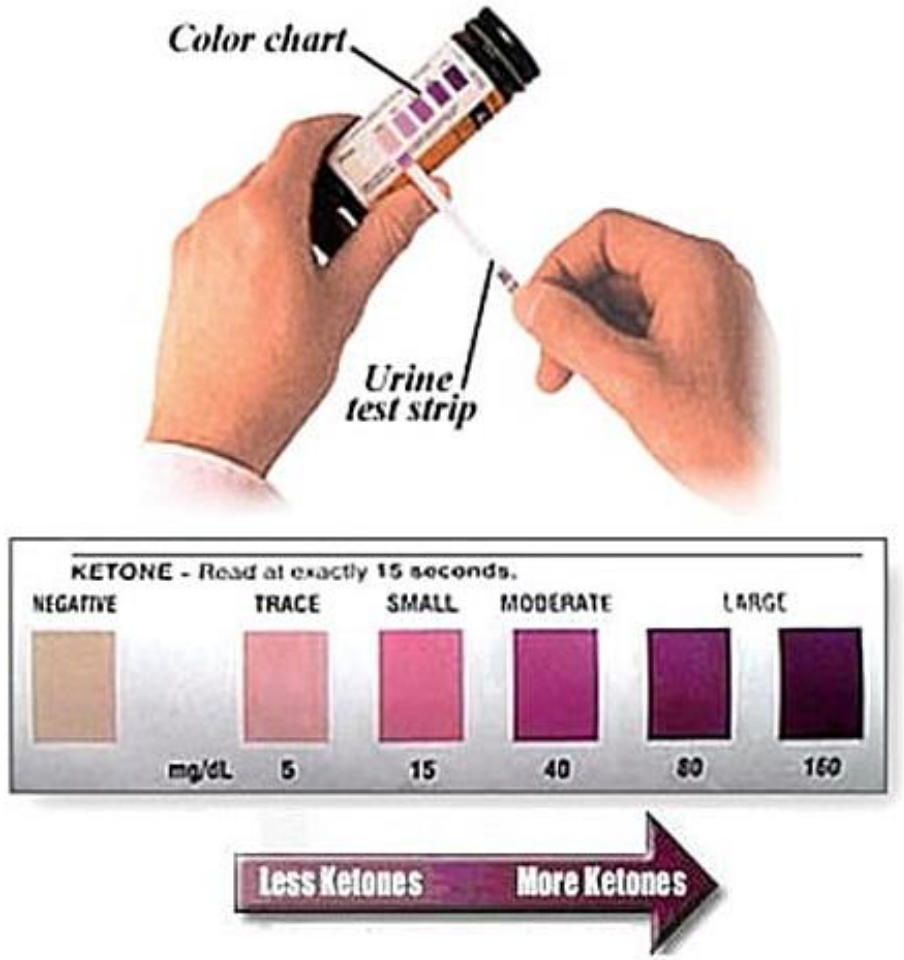
Diabetic Ketoacidosis (DKA)



- Life threatening
- Occurs when ketones accumulate in the body too quickly
- Diabetic Ketoacidosis (DKA) always requires treatment at a hospital in the ICU
- Diabetic Ketoacidosis (DKA) can occur in a few hours or over several days
- Vomiting, fruity smelling breath, strong exhale breathing, and significant flu-like symptoms

When to check for ketones

- 2 blood sugars in a row over 300 mg/dL
- At first sign of illness, regardless of glucose level
- If your child wears diapers, a cotton ball in the diaper will absorb urine for testing



How much fluid does my child need?

- At least 4-6 oz at a minimum
- More fluids are needed if fever, diarrhea, ketones, or vomiting occurs
- Encourage hydration with small and frequent sips or drinking through a straw
- After vomiting, offer sips, ice chips, or popsicle pieces
- Your child's mouth should be shiny and moist. A dry tongue, cracked lips, or dark circles around eyes are signs of dehydration that can worsen ketone production.
- Your child may prefer to drink rather than eat

Once ketones start, we need to give as much insulin as we safely can. If glucose is running below 150mg/dL, we give sugary fluids to push the glucose high enough to give more insulin.

If blood sugar is **less than 150,** give

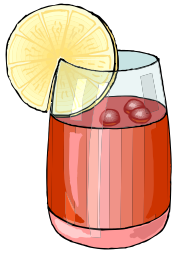
<u>Fluids containing sugar</u>

Clear, flat soda such as
7-up, ginger-ale, sprite
Popsicle
Regular Jell-O®
Juice
Kool-Aid®
Gatorade®

If blood sugar is **more than 150,** give

<u>Sugar-Free Fluids</u>

Water or ice chips
Flat diet soda
Sugar free Popsicle
Chicken broth
Sugar-free Jell-O®
Crystal Light® products
PowerAde Zero
Pedialyte-sugar free

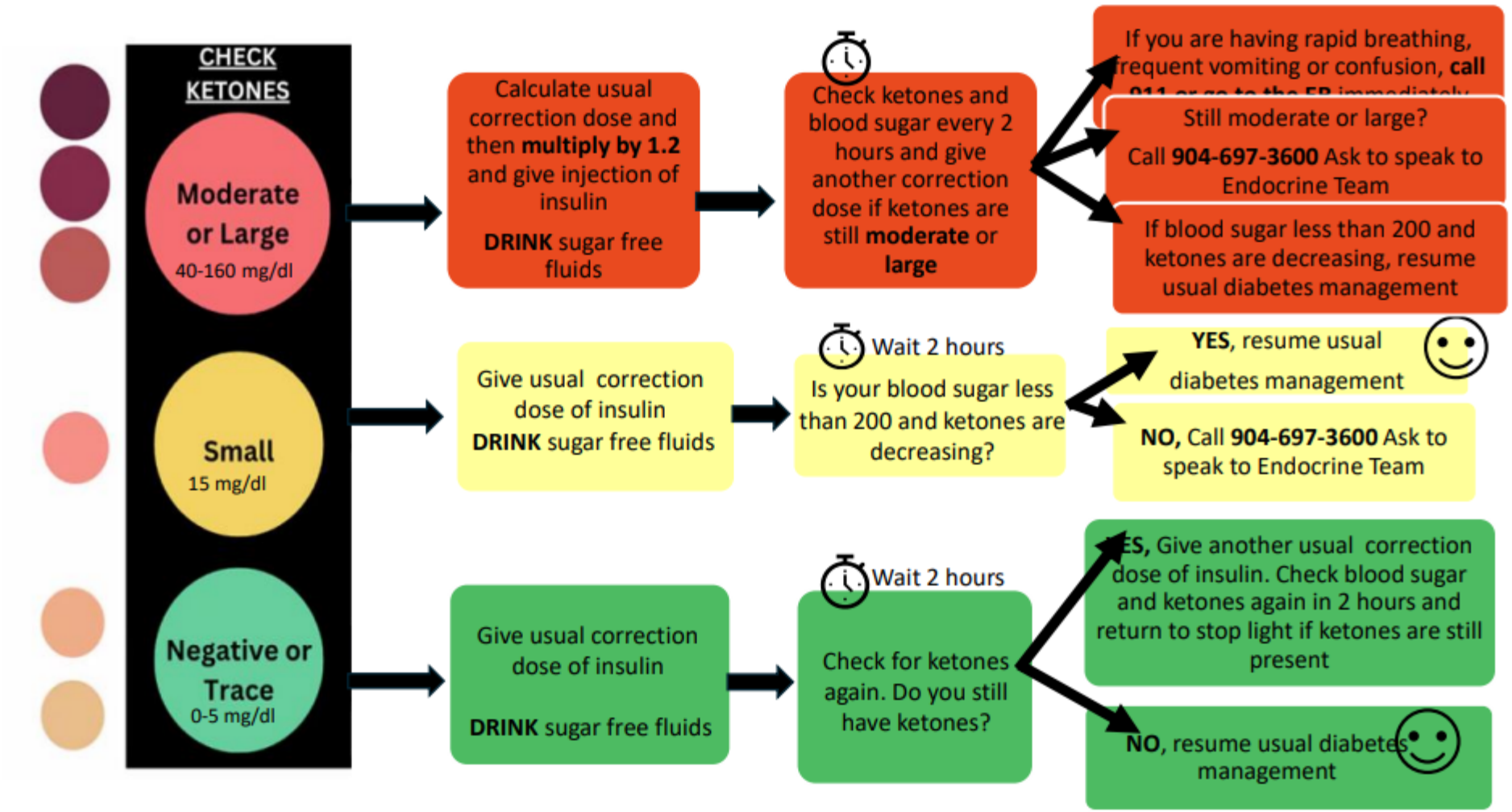


Ketone Action Plan For Injections

Check for ketones if blood sugar is greater than 300 mg/dL for over 2 hours

OR you have NAUSEA, VOMITING, OR FEELING SICK

GO to the **ER** or **CALL 911** If experiencing confusion, frequent vomiting, or rapid breathing



If your child is sick, check blood glucose and ketones

Blood sugar	Treatment	Insulin Doses without Ketones
<70 mg/dl	Treat hypoglycemia with 15 gm fast acting carbohydrates	
70-150 mg/dl	Push carbohydrate containing fluids (soda, sweet tea, juice). If needed, add table sugar to a beverage and give spoonfuls.	Hold carbohydrate coverage. Give correction once above target.
>150	Push carbohydrate free fluids	Cover carbohydrates and correct blood sugar every 2-3 hours. This is great because it allows you to give more insulin.

Ketones = Increased Fluids and Insulin

Ketones	Fluids	Correction doses
Negative	Encourage fluids	Give correction dose every 2-3 hours for high blood sugars
Trace-small	Encourage fluids *(6 oz/hour or as much as your child can tolerate)*	Give correction dose every 2 hours for high blood sugars
Moderate - Large	PUSH even MORE fluids, we must increase the amount of fluids in order to avoid the hospital	**Add 20%** extra to correction doses (multiply dose by 1.2). Give correction doses every 2 hours for high blood sugars. *High blood sugar is helpful because we can give more insulin.*

Who and when to call

Diabetes Team – 904-697-3600, ask for Endocrinology

- Continual vomiting
- Signs of dehydration: dry tongue, cracked lips, dark circles around eyes, eyes appear sunken, decreased urination
- Large or increasing ketones that are not reversing despite attempts
- Call to discuss your child's increased insulin needs
- Call if unable to bring up a low blood sugar despite treatment with sugar
- Signs of DKA (Diabetes ketoacidosis) such as severe abdominal pain, fruity-smelling breath, muscle aches

911

Deep and/or rapid breathing or difficulty breathing, confusion, or won't wake up

Your Pediatrician

- Fever or infection
- Any condition not related to their diabetes

Over the Counter Medications:

- Most over the counter medications have little or no effect on blood sugar. Use as directed on the package.
- Cough syrups, decongestants and lozenges may contain sugar and potentially increase glucose level, but the illness itself impacts the glucose much more than medications.
- Asthma medications and oral steroids (predisone) may increase glucose level to a noticeable degree. Give correction doses as prescribed and call the diabetes team if blood sugars remain high.

Other recommendations:

- The American Diabetes Association along with your physician recommends:
- Influenza or ‘flu’ vaccine and Covid vaccines
- Pneumococcal vaccine- PCV13 for children< 2 years old
- PPSV23 for children 2 years and older

What would you do?

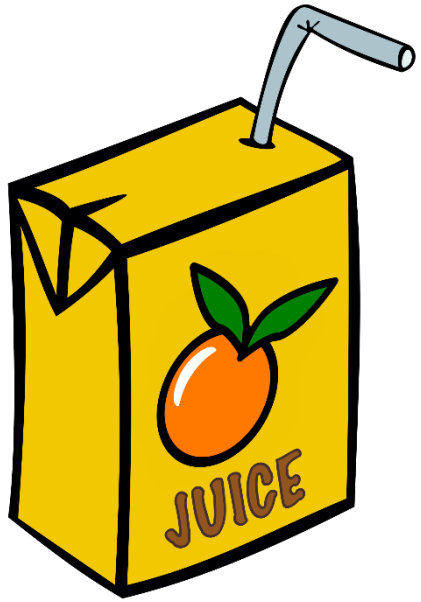
It is 3AM. Your child wakes up vomiting. What is the 1st thing you should do?

A. Call the diabetes team

B. Check blood sugar and ketones in urine

C. Check the temperature

D. Call the primary care physician



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Your child's blood sugar is 90 and ketones are moderate. What should you do?

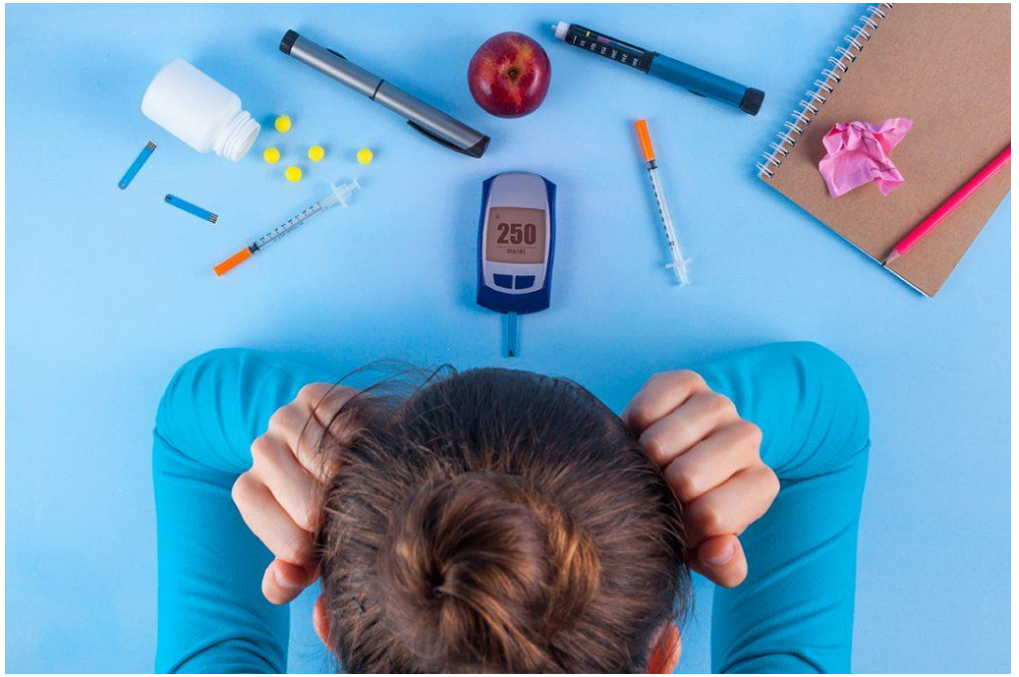
A. Nothing because the blood sugar is in target range
B. Encourage sugar free fluids
C. Give sugar containing fluids and insulin as soon as the glucose levels rise high enough

3) Your child has vomited a third time. You spoke with the diabetes team 2 hours ago, pushed fluids and gave insulin. The current blood glucose is 100 and ketones have increased to large. What do you do?

Social and Mental Health

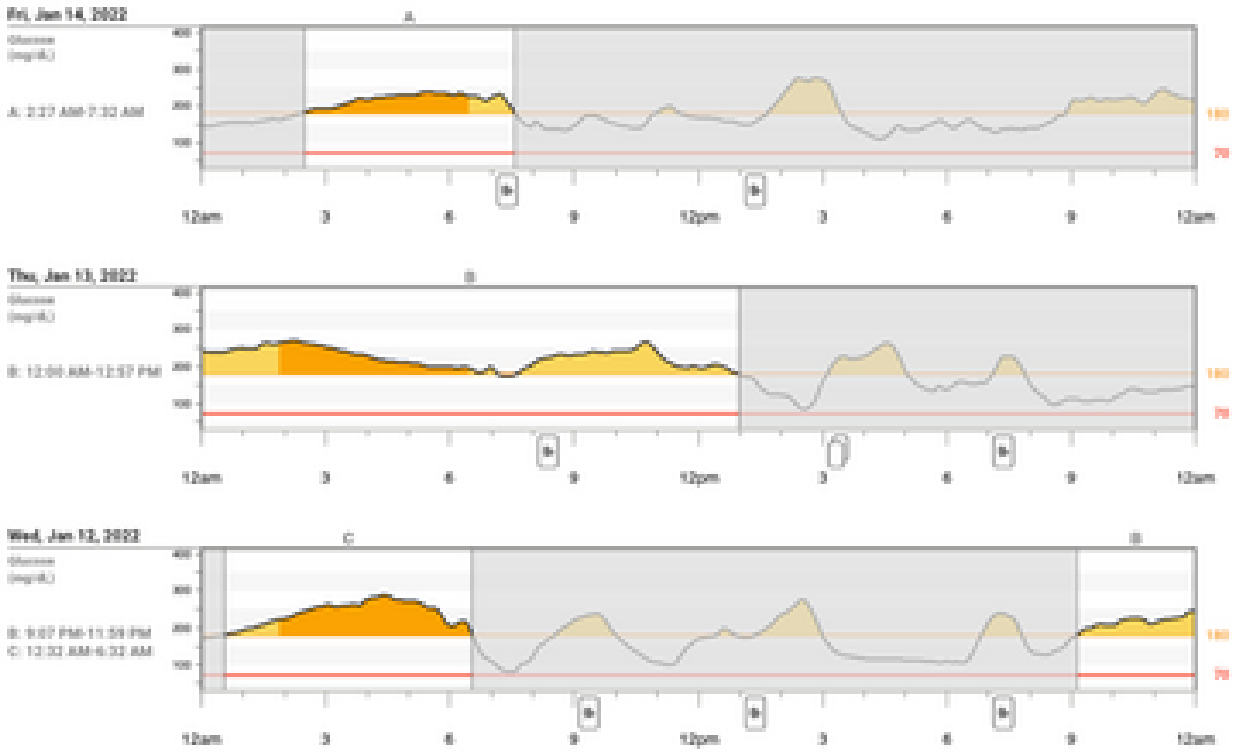
Watch for signs of depression:

- Misbehavior or acting out
- Anger
- Social Isolation
- Poor school performance
- Fatigue
- Thoughts of suicide



Nemours does have a *licensed clinical social worker* who will be glad to meet with you and your child. **904-697-3031**

Trend Management

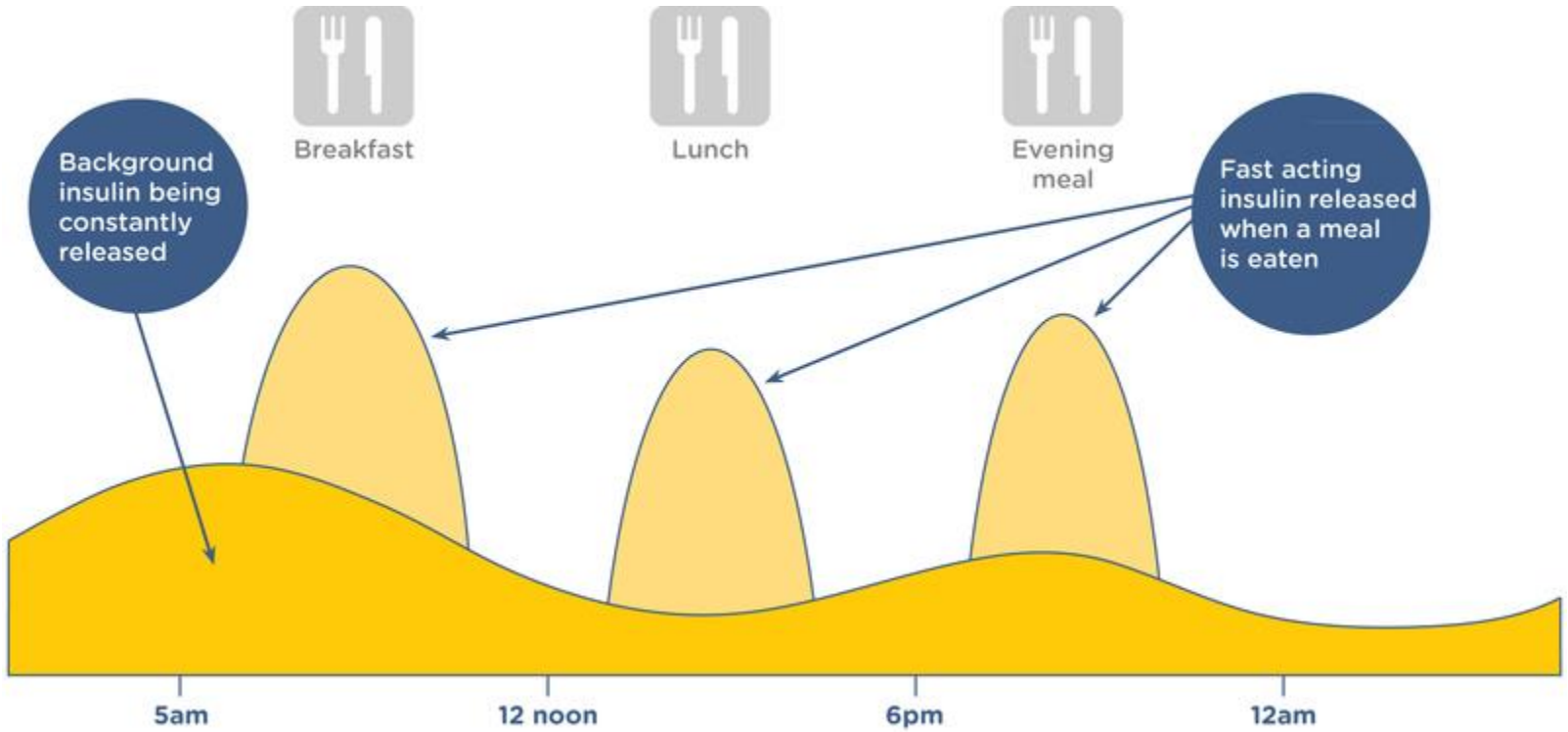


What will you/your child learn?
When and how to:

- Change your basal dosage of insulin
- Change your carb ratio
- Change your correction dose
- Adjust your insulin timing

Other factors that could affect your blood sugar, such as:

- food intake
- exercise or activity level
- Illness
- Stress
- growth and developmental changes



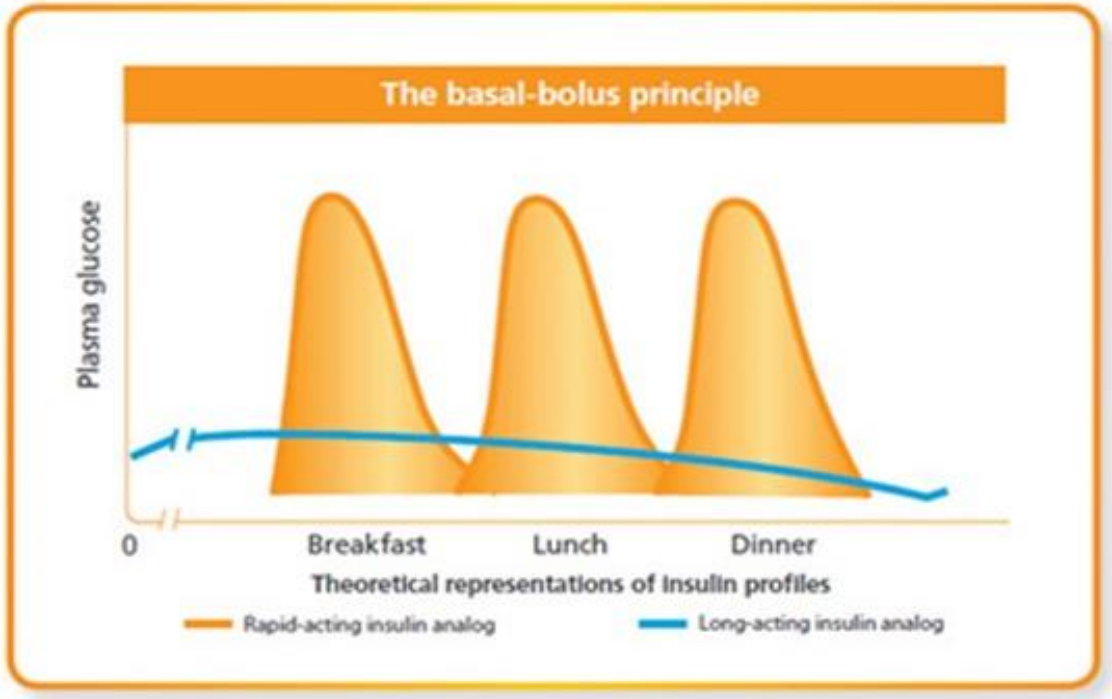
First step: understand the times of action of the insulin.

Glargine's - Basaglar / Lantus / Semglee

1. Takes approximately 2-3 hours to take effect once given at bedtime
2. There is no peak
3. Works for approximately 24 hours

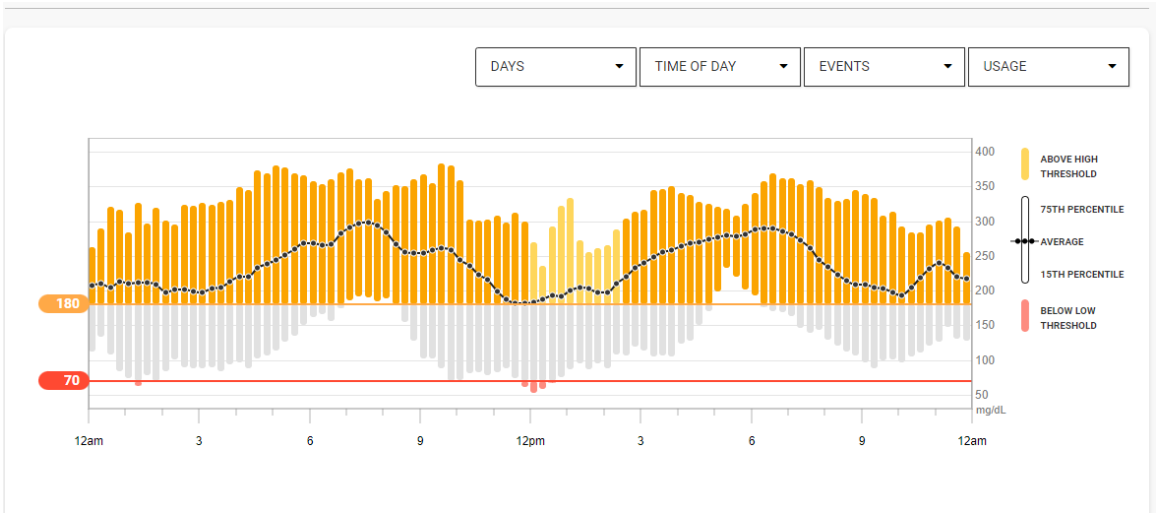
Novolog/aspart / Humalog/lispro:

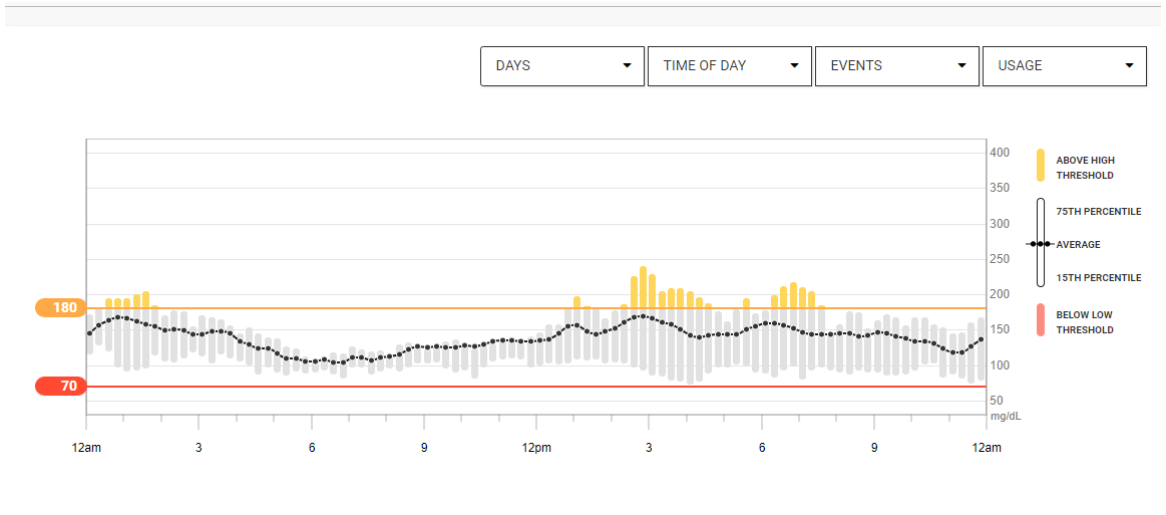
1. Starts working in 5-15 minutes after administration.
2. Peaks in one hour
3. Works for approximately 2-3 hours



Reducing or increasing insulin doses to flatten the glucose levels –

If the blood sugars have been above or below your target range at a repetitive time of day for 2-3 days in a row, the insulin dose should be adjusted. Which insulin is acting at that time? You will want to adjust the dose by 10-20%, repeating every 3-7 days..





Is Lantus too much/too little?
Are we preBolusing for meals?
Are we eating without insulin?
Are alarms helpful?

Goals! It takes time, hard work, and patience with dose adjusting and changing habits, but it is worth it. *You can adjust doses every 3-7 days as needed.*

Scenario #1

Your insulin regimen:

Basal Insulin: __Lantus 20 units_____

NovoLog I/C ratio:__1:10_____, HGB:____1:25>100_____

Blood glucose log book

Breakfast 8 a.m.	Mid-morning 10 a.m.	Lunch 12 p.m.	Mid afternoon 3 p.m.	Dinner 6 p.m.	Bedtime 9 p.m.
275	130	125	220	133	140
204		118	195	101	110
199	97	80	207	112	125
221		98	186	90	138

What pattern do you see? _____

Do you feel that there needs to be an insulin adjustment? _____

If so, which insulin would you change and by how much? _____

Scenario #2

Your insulin regimen:

Basal Insulin: __Lantus 20 units at night_____

NovoLog: I/C ratio:__1:10_____, HGB:_1:25>100_____

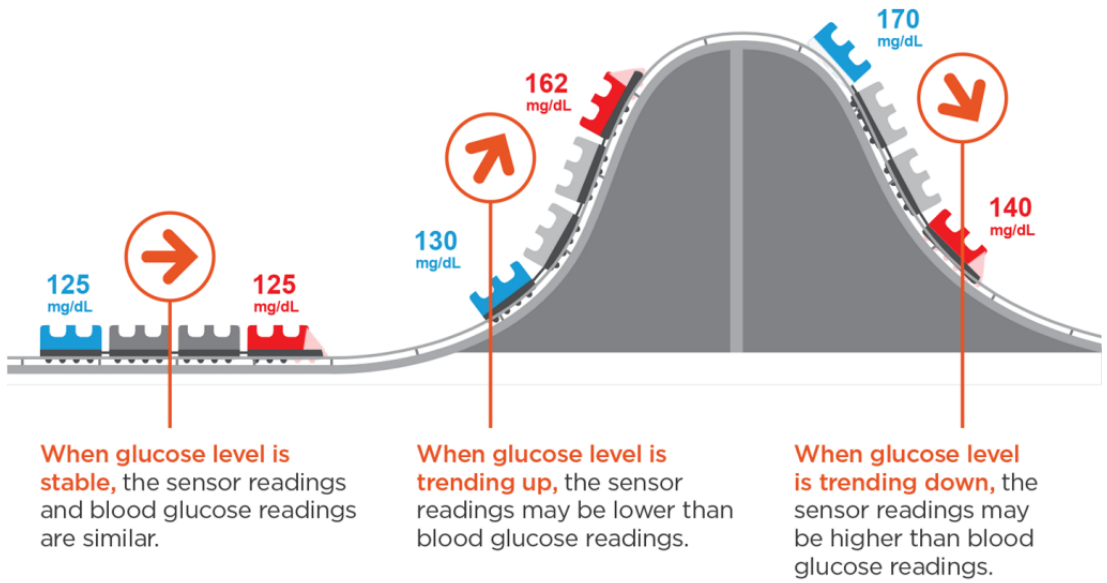
Breakfast 8 a.m.	Mid-morning 10 a.m.	Lunch 12 p.m.	Mid afternoon 3 p.m.	Dinner 6 p.m.	Bedtime 9 p.m.
99	141	65		130	82
104		72	122	90	80
125	113	61		94	78
131		68	130	102	90

What patterns do you see? _____

Do you feel that there needs to be an insulin adjustment? _____

If so, which insulin would you change and by how much? _____

Here is an example to illustrate the lag between blood glucose and sensor glucose:



The front of the train is your blood glucose level,
..the back of the train is the sensor reading.

When flat, go with it.
When climbing or dropping, project forward about 20 minutes.

If your blood sugar is 149 arrow up, where do you think your blood sugar actually is?

If your blood sugar is 88 arrow STRAIGHT down, where do you think your blood sugar actually is?

Reading Dexcom Clarity/Libre View Reports

Overview

← RETURN TO PATIENT LIST
Patient: [redacted]
DOB: [redacted]

Reports

- Overview
- Patterns
- Trends
- Overlay
- Daily
- Compare
- Statistics
- AGP
- Patient Glucose Ranges

Overview

14 Days Tue Feb 6, 2024 - Mon Feb 19, 2024

Average Glucose
150 mg/dL

Standard Deviation
52 mg/dL

GMI
N/A

Time in Rang
6% Very High
16% High
77% In Range
<1% Low
<1% Very Low
Target Rang
70-180 mg/dL

Sensor Usage
Days with CGM data
86%
12/14

Avg. calibrations per day
0.9

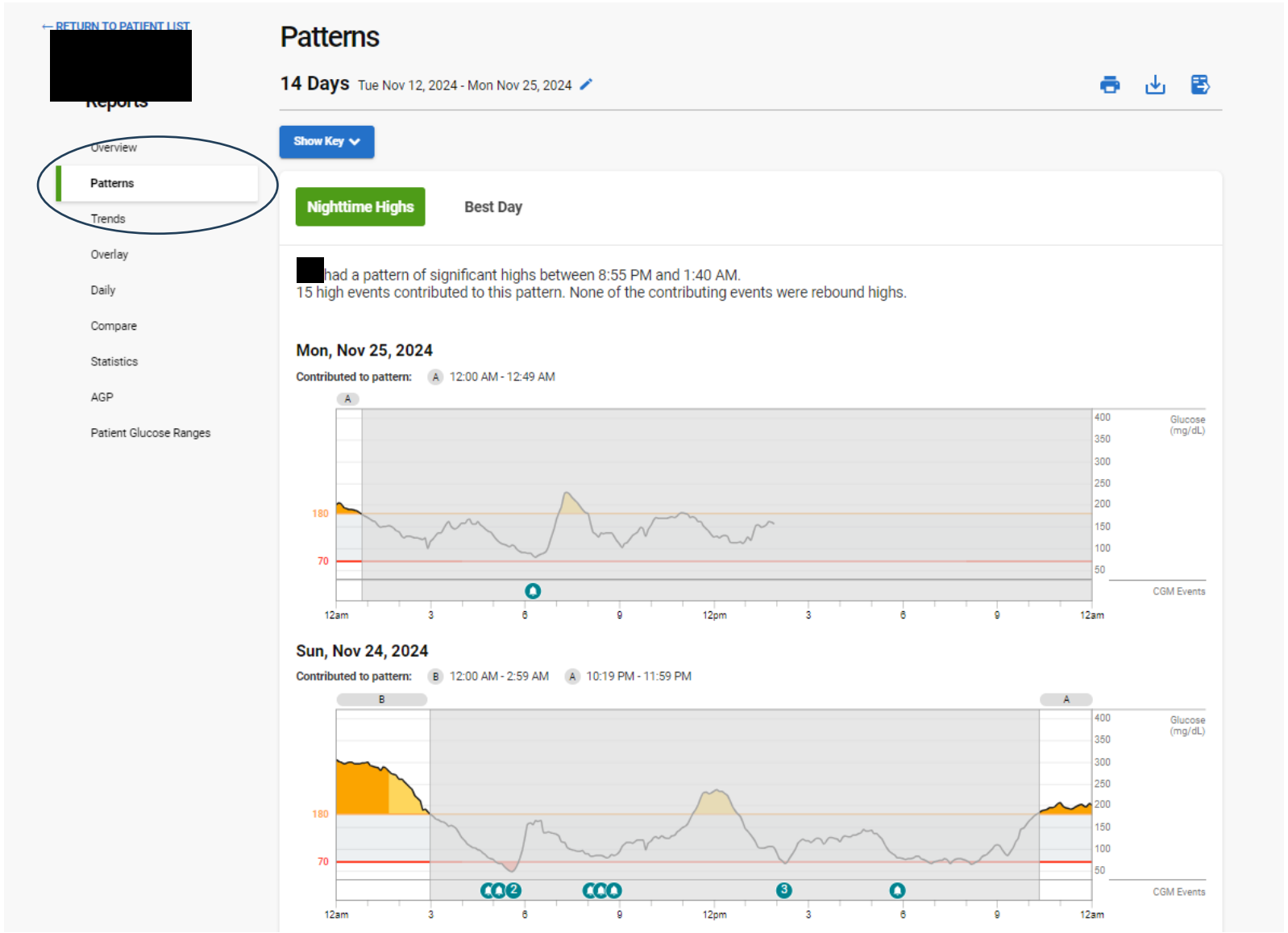
We found no patterns during this date range.
The best day was February 15, 2024.

[redacted]'s best glucose day
[redacted]'s glucose data was in the target range about 90% of the day.

GOALS

> 70% of readings within BG range of 70-180mg/dL
< 4% of readings < 70 mg/dL
< 1% of readings < 54 mg/dL
< 25% of readings > 180 mg/dL
< 5% of readings > 250 mg/dL

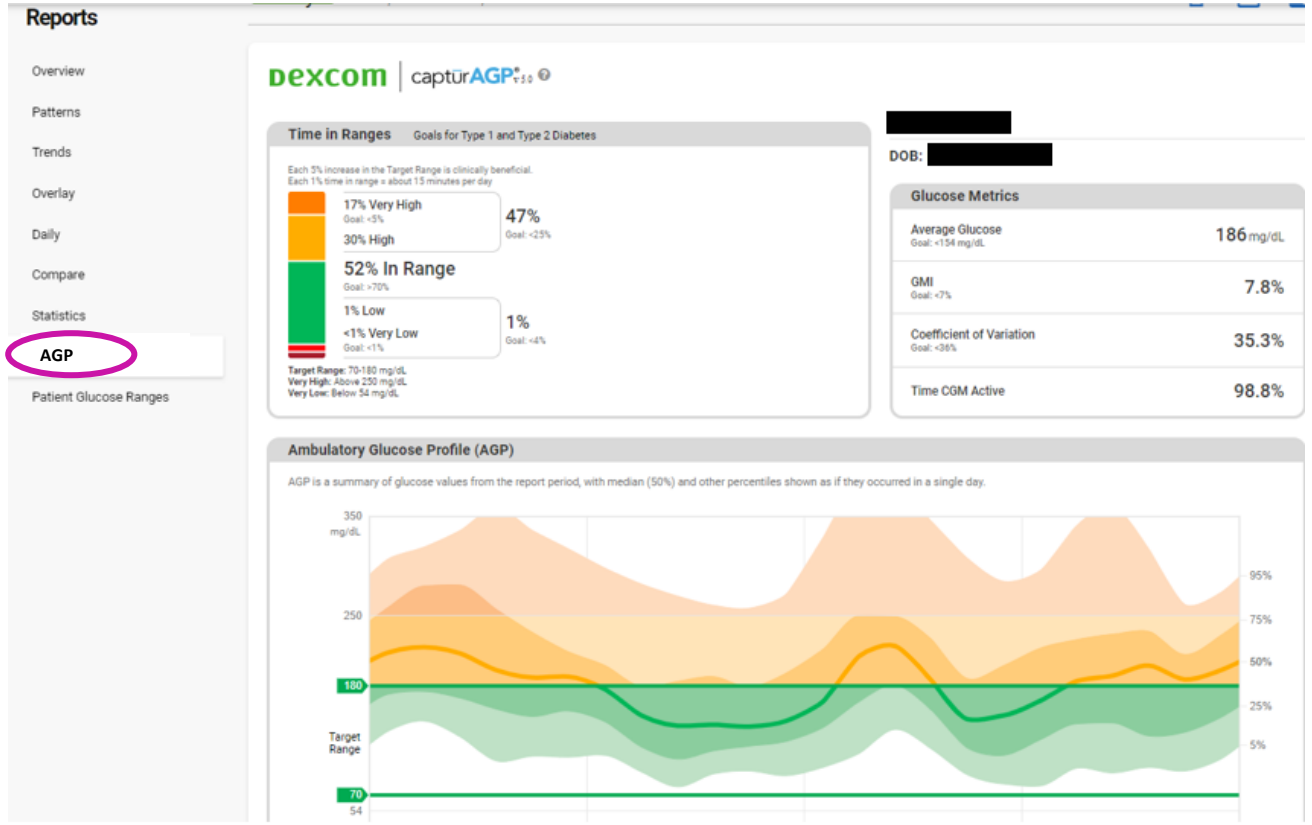
Patterns

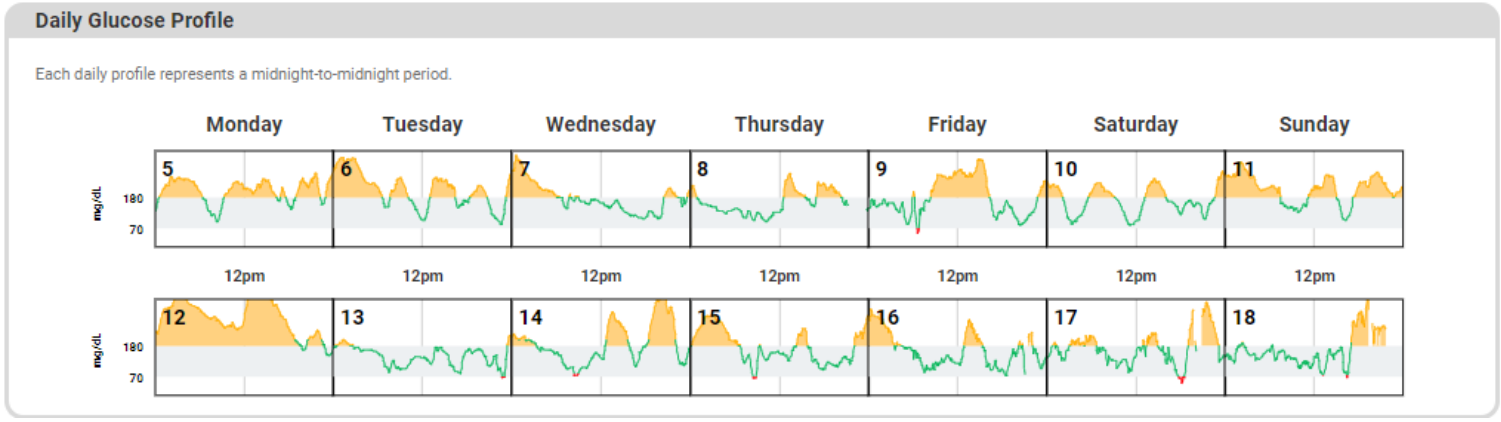

← RETURN TO PATIENT LIST
[redacted]
Reports
Overview
Patterns
Trends
Overlay
Daily
Compare
Statistics
AGP
Patient Glucose Ranges
Patterns
14 Days Tue Nov 12, 2024 - Mon Nov 25, 2024
Show Key
Nighttime Highs
Best Day
[redacted] had a pattern of significant highs between 8:55 PM and 1:40 AM.
15 high events contributed to this pattern. None of the contributing events were rebound highs.
Mon, Nov 25, 2024
Contributed to pattern: A 12:00 AM - 12:49 AM
Sun, Nov 24, 2024
Contributed to pattern: B 12:00 AM - 2:59 AM A 10:19 PM - 11:59 PM
Glucose (mg/dL)
CGM Events
180
70
12am
3
6
9
12pm

Daily View


Daily
Compare
Statistics
AGP
Patient Glucose Ranges
CGM
Calibrations
Alerts
Thu, Sep 30, 2021
Glucose (mg/dL)
400
300
200
100
180
70
12am
3
6
9
12pm
3
6
9
12am
1:36 AM
Low
1:41 AM
Urgent Low Soon
2:05 AM
Low
7:46 AM
Rise Rate
7:46 AM
High
8:21 AM
High
Wed, Sep 29, 2021
Glucose (mg/dL)
400
300
200
100
180
70
12am
3
6
9
12pm
3
6
9
12am
9:25 AM
1:10 PM
1:25 PM
1:45 PM

AGP


Reports
Overview
Patterns
Trends
Overlay
Daily
Compare
Statistics
AGP
Patient Glucose Ranges
dexcom | captūrAGP
Time in Ranges
Goals for Type 1 and Type 2 Diabetes
Each 5% increase in the Target Range is clinically beneficial.
Each 1% time in range = about 15 minutes per day
17% Very High
Goal: <5%
30% High
47%
Goal: <25%
52% In Range
Goal: >70%
1% Low
<1% Very Low
Goal: <1%
1%
Goal: <4%
Target Range: 70-180 mg/dL
Very High: Above 250 mg/dL
Very Low: Below 54 mg/dL
[redacted]
DOB: [redacted]
Glucose Metrics
Average Glucose
Goal: <154 mg/dL
186 mg/dL
GMI
Goal: <7%
7.8%
Coefficient of Variation
Goal: <36%
35.3%
Time CGM Active
98.8%
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.
350
mg/dL
250
180
Target Range
70
54
95%
75%
50%
25%
5%


Daily Glucose Profile
Each daily profile represents a midnight-to-midnight period.
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
mg/dL
180
70
5
6
7
8
9
10
11
12pm
12
13
14
15
16
17
18

Empowering you to take control

- You got this!
- We are here to back you up if you get stuck.
- 10-20% changes and wait 3-4 days for patterns