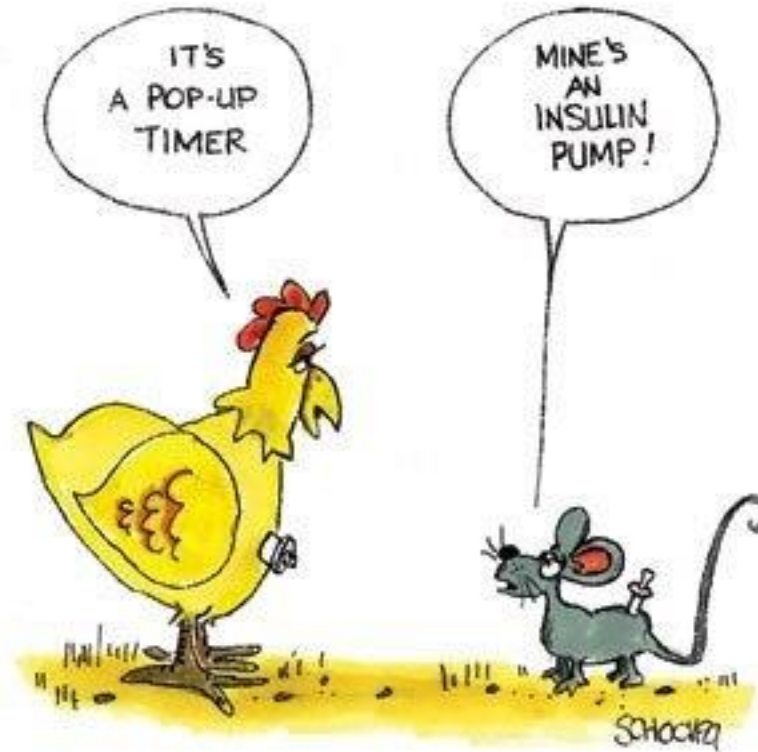


Experiencing Technology



Traci P. Scott, RN, CDE

Objectives

- Discuss what an insulin pump is and does.
- Identify and discuss helpful features on a pump.
- Correctly give a bolus by insulin pump.
- Correctly set & use a Temp Basal Rate
- Correctly find & check History Screens
- Trouble shoot an insulin pump.
- Verbalize who/how to call for assistance with a malfunctioning insulin pump

Objectives continued:

- Discuss what a CGM is and how it functions
- Correctly obtain a blood glucose from a CGM
- Understand arrows on a CGM
- Trouble shoot a CGM

Medtronic



TANDEM[®]
DIABETES CARE

Think of a pump as an external pancreas.



How Pumps Work

- Use Rapid-Acting Insulin
- Individual Settings from HCP
- Basal/Bolus functions
- Require blood glucose number
 - Needed for correction
- Require carb count
 - Needed for accurate food coverage
- Require a “good” site
 - Prevents DKA

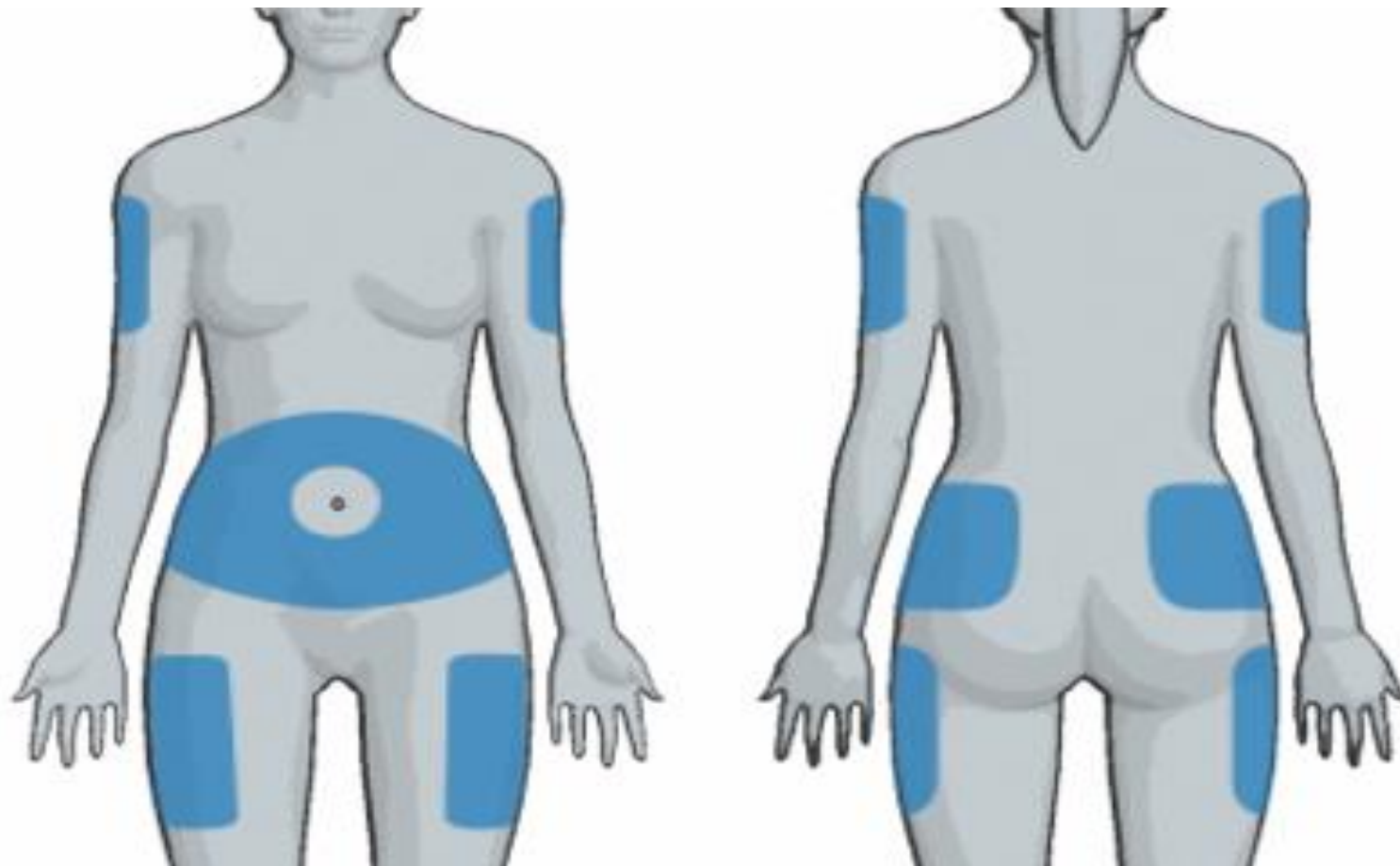
Pump Sites

- Tiny cannula inserted under skin
- Changed every 2-3 days
- Connected to insulin source-cartridge or pod

Pump Sites



Possible Site Placement



Infusion Site Management

- Can use any place that would normally put an injection
- Avoid lumpy/bumpy areas
- Avoid scars/tattoos
- Avoid areas that are rubbed by clothing
- New site should be an inch from old site
- New site should be at least an inch from umbilicus
- If blood is visible in tubing, change site
- If stinging continues more than an hour after insertion, change site.
- Best time to change site is after a bath, but NOT late at night, OR before a meal.

Insulin Pumps



Helpful Features on a Pump

1. Main Screen
2. History Screen
3. Bolus Screen
4. Set Up
5. Customer Service Number

Main Screen

First Screen seen on a pump. Features will see include:

- Date
- Time
- Battery life
- Insulin remaining
- Special option running

Bolus Screen

Can pick between several types of bolus—

1. normal, which is a set amount that basically requires little thought
2. BG, which covers just blood sugar correction
3. Carb, which covers food and can also cover blood sugar if entered
4. Can do combo bolus or extended bolus from carb bolus also.
Allows to pick part of a bolus to be given immediately and remaining bolus to be given over a specified amount of time.

Giving a Bolus for meals:

- Go to Bolus Screen.
 - Enter BG if giving for a meal
 - Enter carbs
 - Read Screen to make sure entered correctly
 - Give bolus.
-
- IF BOLUS IS FOR SNACK, DO NOT NEED A BG UNLESS HAVE A REASON TO DO A BG. BG JUST BECAUSE THE STUDENT IS GOING TO EAT A SNACK IS NOT NECESSARY UNLESS ORDERED BY PHYSICIAN OR HAS OTHER CIRCUMSTANCES...FEELS LOW, EXTRA ACTIVITY, ETC.

History Screen

Will show basal history, bolus history, suspend, resume, prime, alarms, total daily dose.

Can see if bolus was missed, if cartridges are being changed greater than every 3 days, if insulin delivery was stopped.

Can see what kind of bolus was given and when---will be able to identify missed bolus, no blood sugar being entered for correction.

Will NOT show if pump was removed.

Temporary Basal Rate

- Useful for hypoglycemic episodes

Set temp rate for off for 30min. to allow fast-acting carbs to increase BG

Useful for hyperglycemic episodes with ketones

Set temp rate for 10% increase x 2 hr. to help decrease BG and ketones

Will return to normal basal rate when time frame up; does NOT require you to turn basal rate on again. Does it automatically.

Hybrid Closed-Loop System

- Medtronic 670G
- Increases/decreases basal rates based on cgm readings
- Wear 2 pieces: site and sensor
- Must still bolus for food
- Must calibrate 4 x day



Tandem Predictive Hypo-minimizer

- Tslim x 2 pump
- Can upgrade software without new pump
- Predicts low based on 4 blood glucose readings taken 5 min apart with Dexcom
- Turns basal rate off/on based on these readings; however, does not increase or decrease basal rates-on or off.



Safety Lock

All pumps have a lock for safety purposes. These are especially useful for young children.



Remember...

- No blood glucose entered...no correction given.
- No carbs entered...no accurate food bolus given.
- Entering a random number of units...random results.

- **Look at the History Screens.**

Insulin Pump Use is ONLY as Accurate as Person Operating It.

AND....

When in doubt, change it (site) out.



Trouble Shooting an Insulin Pump

1. Check INFUSION SITE for:

- redness
- rash
- damp/leaking
- odor (smell of insulin or infection)

2. Check INFUSION SET for

- air bubbles in tubing
- Luer lock is tight; no leaking



3. Check INSULIN PUMP for:

- status (pump is on)
- alarm message
- correct basal program running
- correct time displayed
- battery sign
- bolus history review

4. Call for help if needed. (Customer support phone number is on back of pumps.)

Customer Support Number

Found on BACK of pump:

Medtronic (& Animas): 1 (800) 633-8766

Omnipod: 1 (800) 591-3455

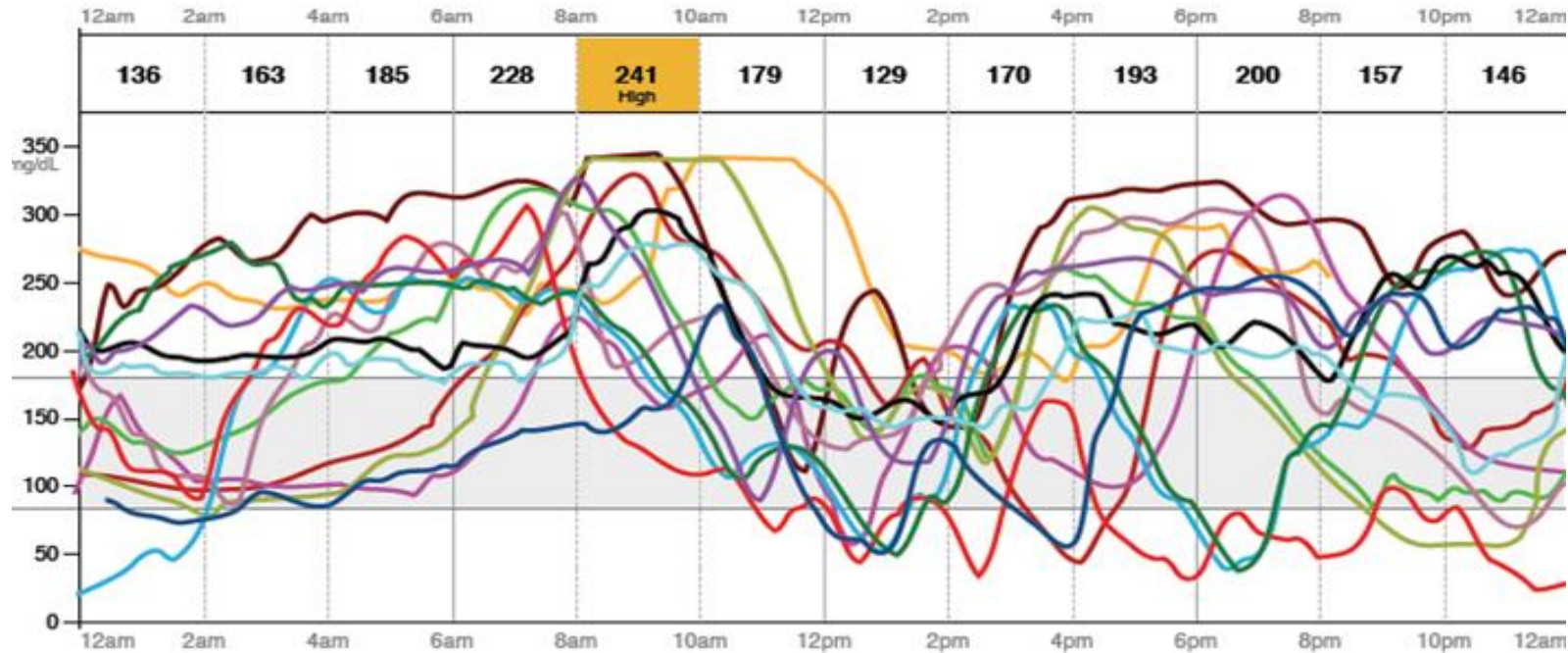
Tandem: 1 (877) 801-6901

You can reach support for pump problems 24/7.

Do not call customer service number on back of an Animas Pump.

Continuous Glucose Monitors

Estimated A1c 7.8%, or 62 mmol/mo



How Do CGMs Work?

CGMs measure blood glucose in interstitial fluid just below the surface of the skin through a tiny sensor. Most CGMs consist of a sensor, transmitter, and receiver. The receiver could even be an insulin pump, cell phone, or Apple Watch depending on the system!

CGMs: help find trends, not just a single BG “snap shot”. Help make treatment decisions to promote more time in range.

Dexcom[®]
CONTINUOUS GLUCOSE MON

FreeStyle *Libre* 

Medtronic

Dexcom®

CONTINUOUS GLUCOSE MONITORING

- Provides a blood glucose every 5 min
- G6 requires no calibration
- Hypo/Hyper alarms
- Sensor worn for 10 days
- Approved for dosing
- Clarity App
- Follower x 5
- Can use with Apple Watch

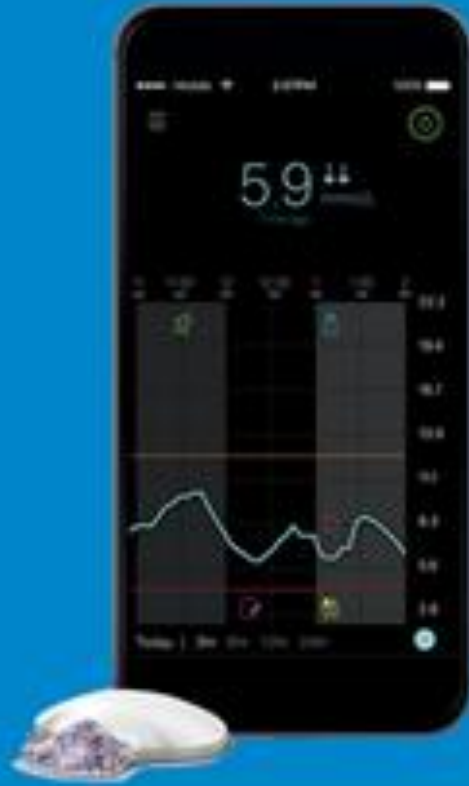


FreeStyle *Libre*

- Checks blood glucose every minute,
but must scan to see BG
- No alarms
- Has 12 hr. warm up
- Does not “push” information-yet
- Approved for dosing



GUARDIAN™ CONNECT



Medtronic

- Blood Glucose every 5 minutes
- Calibration required at least every 12 hr.
- One hour predictive alerts
- No age restriction for use
- Can share information with 5 people

Why Use a CGM?

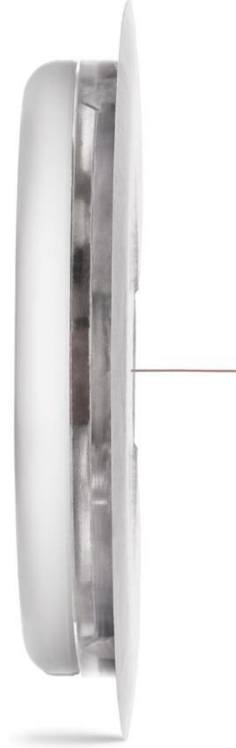
Most obvious: less fingerstick!

Other good reasons:

- **Provide continuous glucose monitoring, day and night.**
- **Thought to lower HgbA1c**
- **Decrease hypoglycemia**
- **Decrease night monitoring**
- **Increase time in range**



Sensors



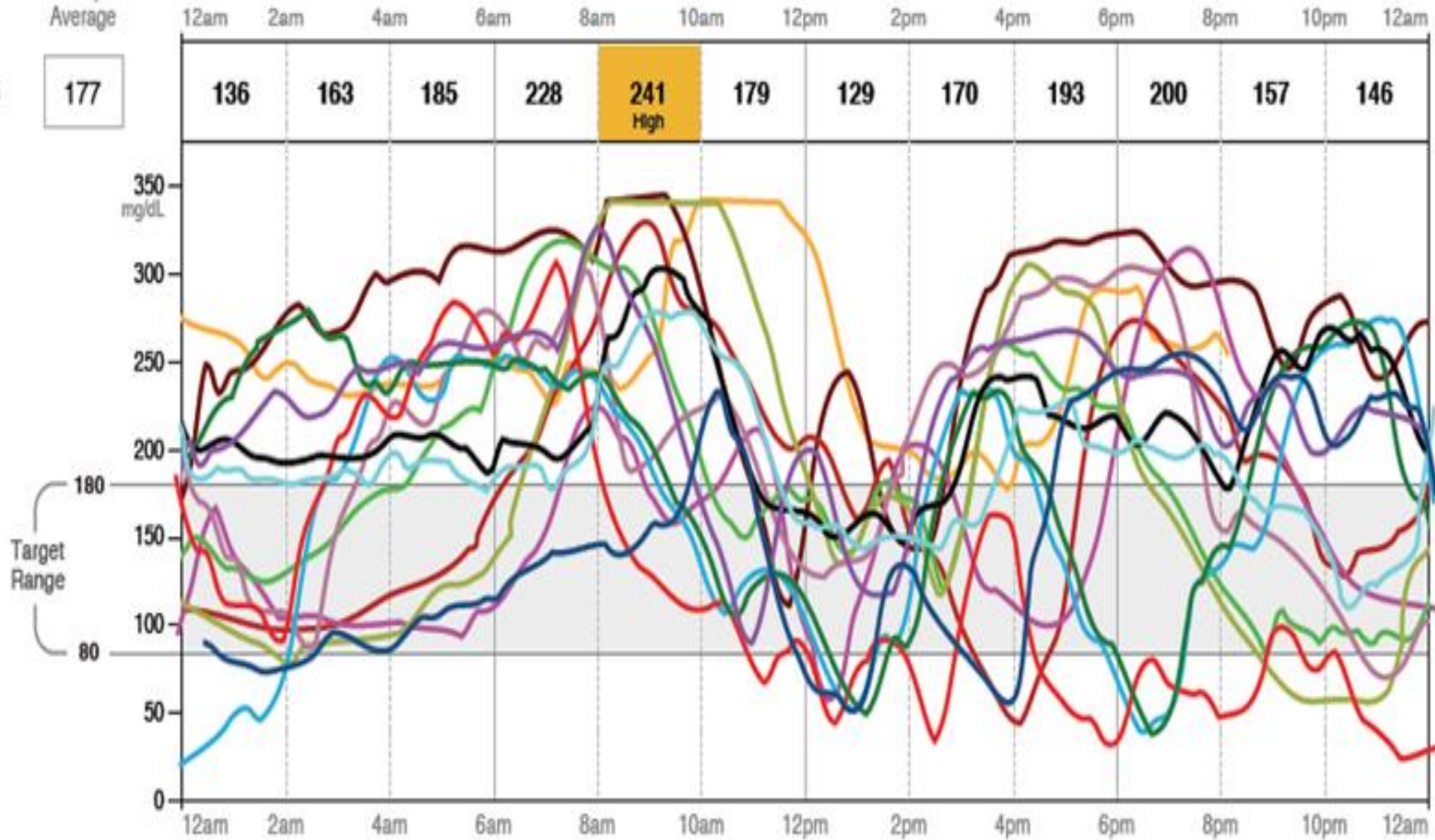
Still Need a Fingertick...

- Suspect inaccurate readings
- Signs/symptoms don't match number
- Symbol/system ask for fingertick
- System requires calibration

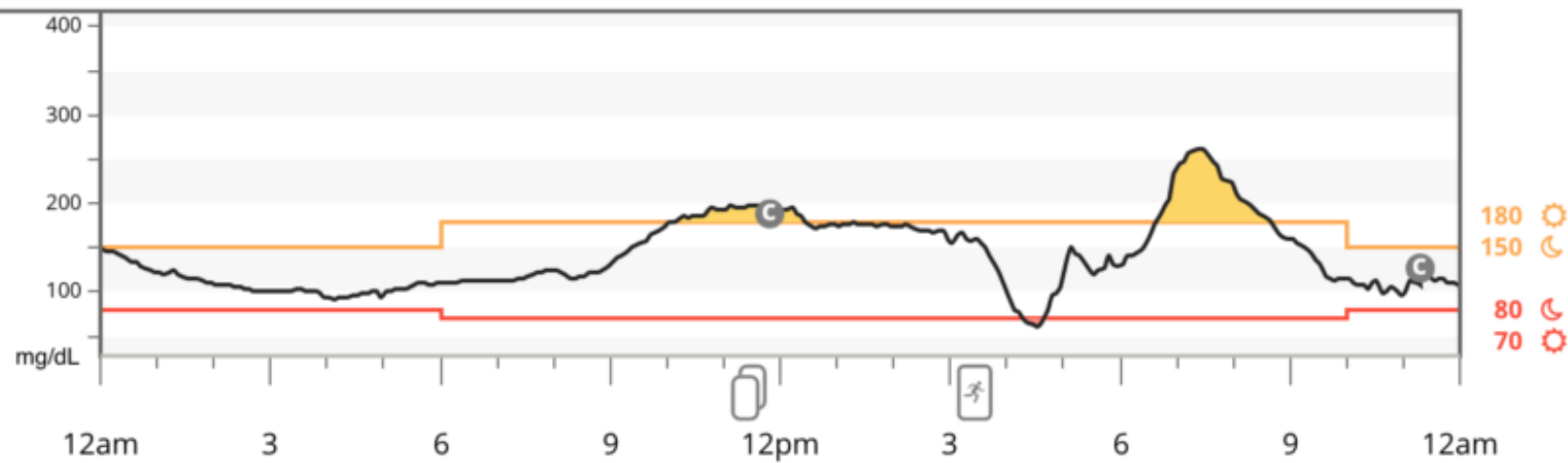
Glucose
mg/dL

Daily
Average

177



TUE
FEB 27, 2018



☒ CGM ☒ Calibrations ☐ Alerts

Statistics for this day

141

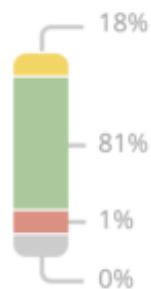
mg/dL

Average glucose
(CGM)

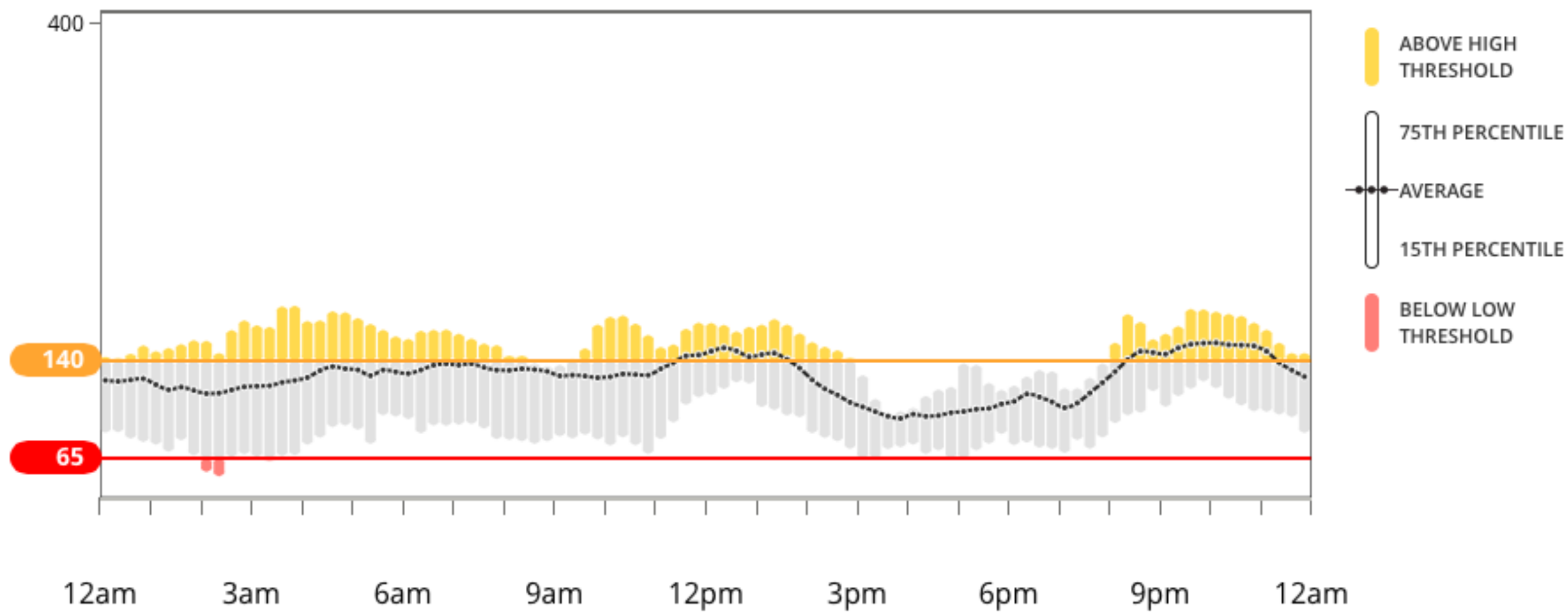
41

mg/dL

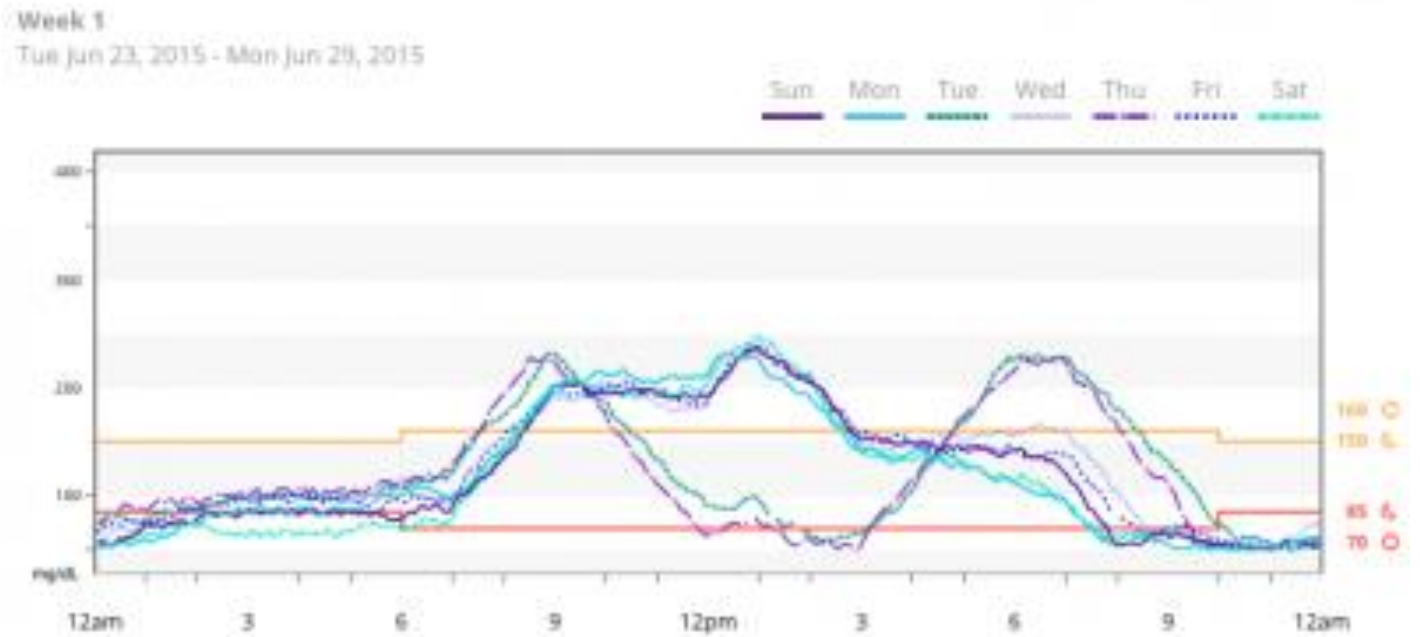
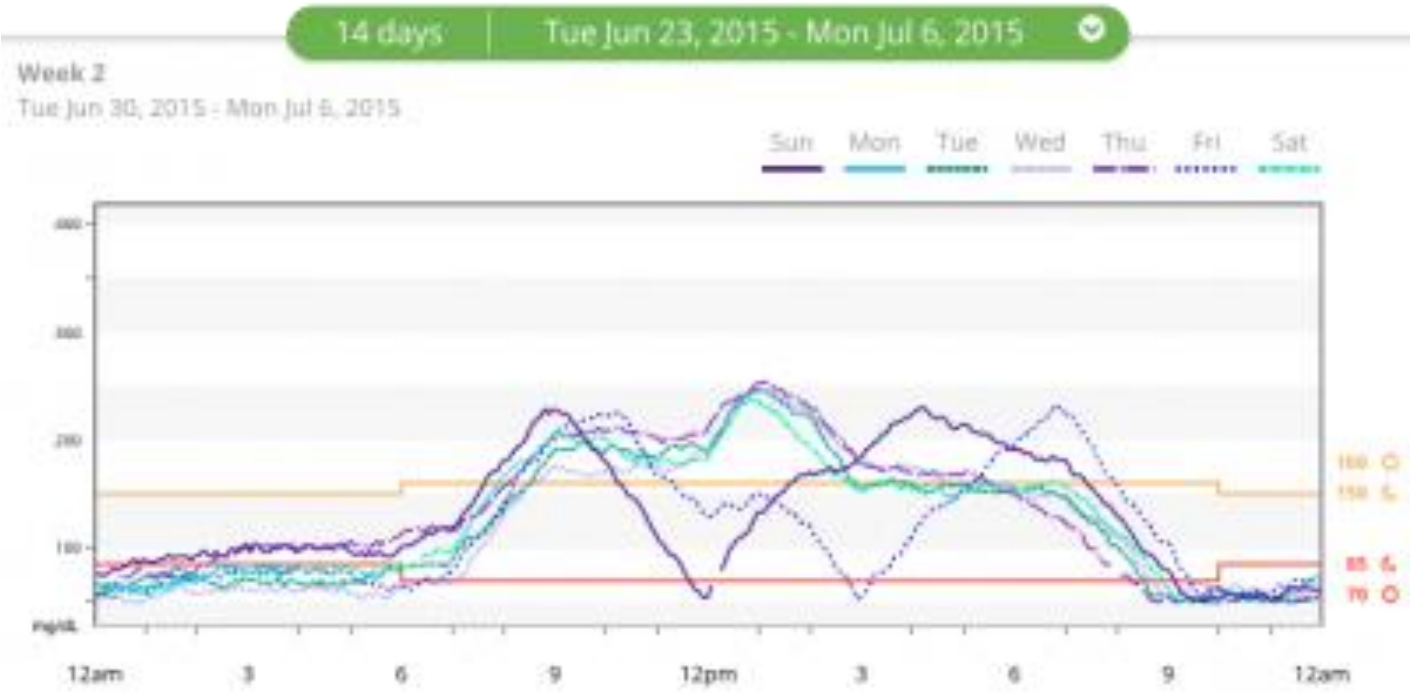
Standard deviation
(CGM)



Time in range



Arrows, Trends, & Patterns



Select two date ranges to compare side-by-side.



Trends Daily

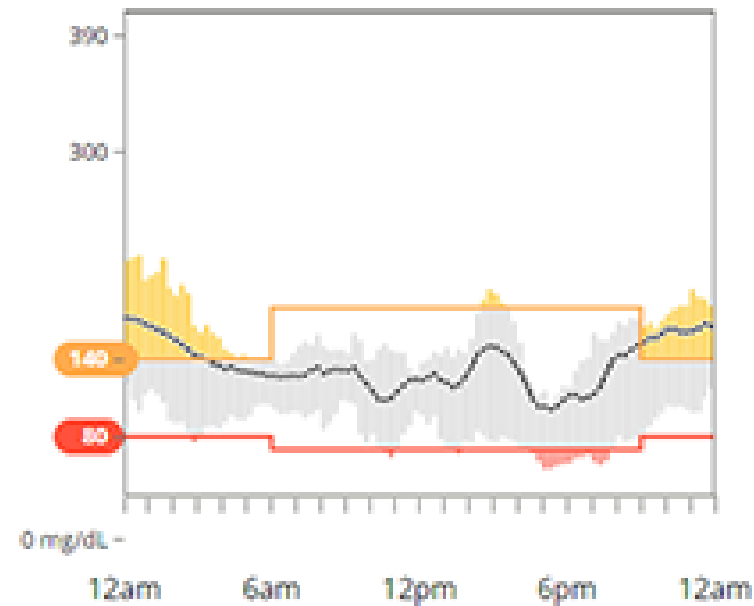
DAYS

TIME OF DAY

EVENTS

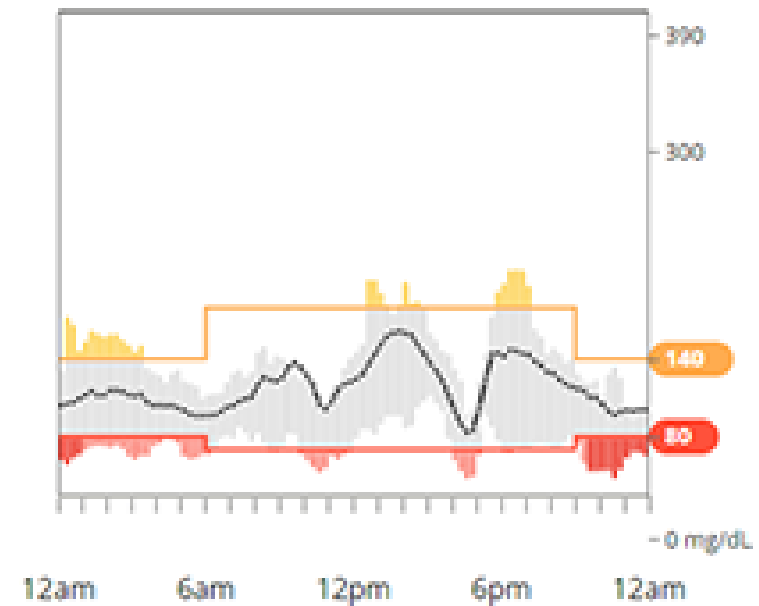
ADHERENCE

14 days | Thu Jan 30 - Wed Feb 12, 2015



☒ CGM ☐ Calibrations

14 days | Thu Feb 13 - Wed Feb 26, 2015



☒ CGM ☐ Calibrations

30 days

Tue Oct 24, 2017 - Wed Nov 22, 2017



159

mg/dL

Average glucose
(CGM)

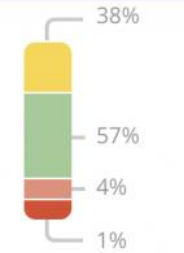
60

mg/dL

Standard
deviation
(CGM)



Hypoglycemia
risk



Time in range

Days with
CGM data 83%
25 / 30

Avg.
calibrations
per day 0.5

Sensor usage

**We found 1 pattern during this date range.
The best day was November 17, 2017.**

1

Alexandra had a pattern of daytime highs

Alexandra had a pattern of significant highs between 2:00 PM and 2:35 PM.
20 high events contributed to this pattern. 2 of the contributing events were rebound highs.



2

Alexandra's best glucose day

Alexandra's glucose data was in the target range about 90% of the day.



Trouble Shooting a CGM

- Check Sensor/Transmitter
- Check distance of sensor to transmitter to receiver
- Be patient
- If in doubt, do fingerstick glucose
- Call CGM customer service.

Dexcom: 1-888-738-3646

Medtronic Guardian Connect:

Abbott Freestyle Libre: 1-855-632-8658

Pump Emergencies

- Bad Site
- Pump Malfunction



If the pump malfunctions or the site is bad, the student gets NO basal insulin, which means that DKA can occur quickly (2-3hr) without this.

Student needs back up plan—refer call parent also.

When Diabetes Technology Fails:

Need available::

- Rapid acting insulin in pen/vial form
- Insulin syringes/pen needles
- Extra sites, cartridges available
- Ketone sticks or strips available
- Glucometer and strips available

High Blood Sugar

- Possible Causes:

- bad site
- carb counting inaccurate
- time on clock wrong
- did not use blood sugar at last meal in calculation
- missed bolus





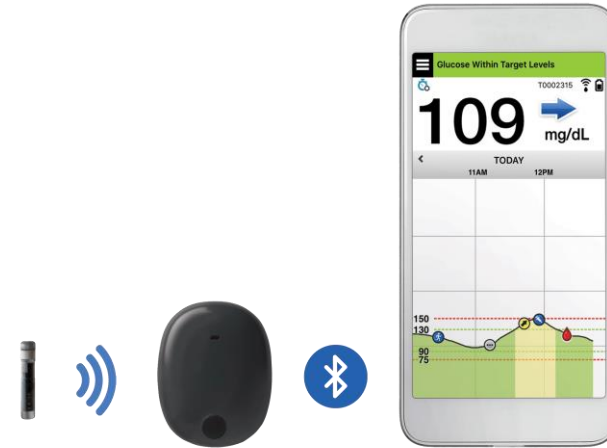
Here's to the Future...

Convenience

dexcom
CONTINUOUS GLUCOSE MONITORING

+

verily



Eversense CGM

From Urine to Blood to Interstitial Fluid...



Techy Apps

- Blue Loop
- Dexcom
- Dexcom Clarity
- Dexcom Share
- Fooducate
- Glooko

Items to Keep at School

- Extra sites & cartridges
- Extra rapid acting insulin
- Rapid acting insulin pen or insulin & syringes
- Glucagon
- Glucometer strips
- Ketone sticks
- Fast acting carbs
- Snacks
- Water
- Glucometer batteries
- Pump batteries



Questions?

- TRSCOTT@augusta.edu
- 706-721-4158 (office)
- 706-721-9469 (desk)
- 803-804-4978 (cell)

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THANK YOU for CARING

