

Pondering Pumps and Sensors



Children's Mercy
KANSAS CITY



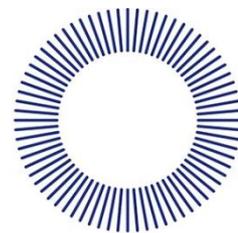
Disclosures

Dexcom[®]

FreeStyle *Libre*



Medtronic



omnipod[®]



TANDEM[®]
DIABETES CARE



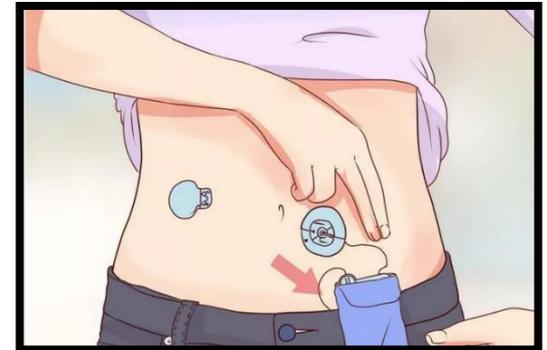
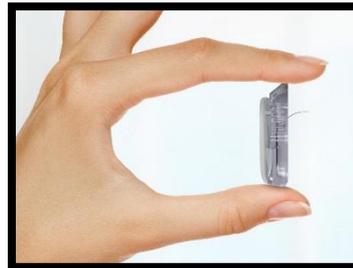
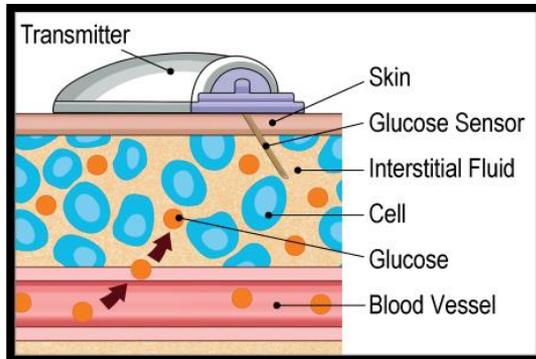
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Continuous Glucose Monitoring (CGM)

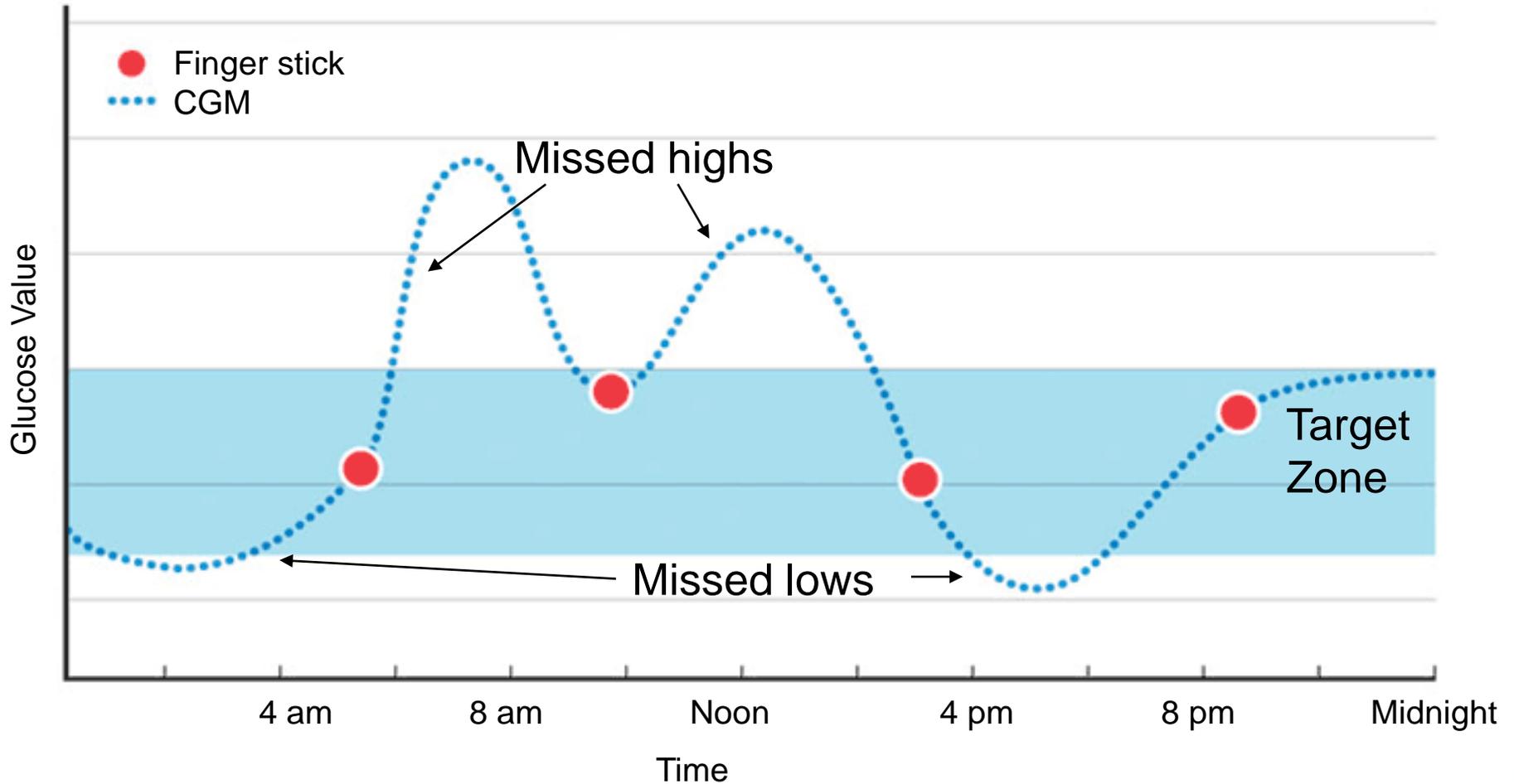


How Sensors Work

- Contains 3 parts:
 - **Sensor**-thin filament underneath the skin
 - **Transmitter**-battery device that transmits data
 - **Receiver**-device that displays data
- Continuously measures glucose in fluid between the cells
- 7-14 day wear (depending on brand)



Fingersticks vs CGM data



CGM Gives More Data

- A finger stick number can't tell you which way the BG is headed and how fast it's getting there
- CGM can observe effects of exercise, food choices, etc. on blood glucose



If you saw this number, what would you do?



If you saw this instead, would you do something differently?

Dexcom G6

- Stand-alone CGM
- Able to dose using CGM data
- No finger sticks required
- 10-day wear
- 2 hour warm up period (with start)
- Has alarms for highs and lows
- Data sent directly from transmitter to apple or android device, Garmin devices, or receiver
 - If sent to smart device, data can be followed from up to 5 iPhones or Android phones
 - Check for Android or Garmin compatibility



*FDA approved for 2 y/o and older

Freestyle Libre

- Stand-alone CGM
- Must swipe in order to view data
- Able to dose using CGM data
- No finger sticks required
- One hour warm up period (with start)
- Can scan with receiver or iPhone app
 - iPhone 7 or newer
 - Check for Android compatibility
- 14-day wear
- No alarms for highs or lows



*FDA approved for 18 y/o and older

Freestyle Libre 2

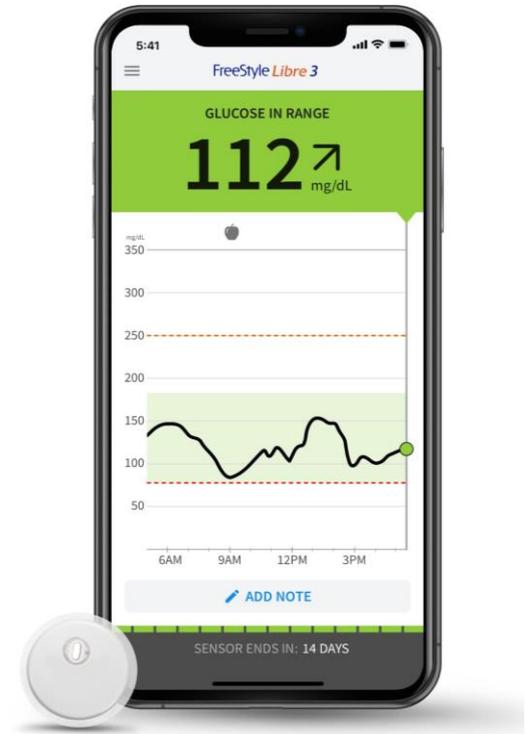
- Stand-alone CGM
- Continuous Glucose Monitoring
- Able to dose using CGM data
- No finger sticks required
- Can scan with receiver or phone
- 14-day wear
- Has alarms for highs or lows
- Up to 20 people can follow



*FDA approved for 4 y/o and older

Freestyle Libre 3

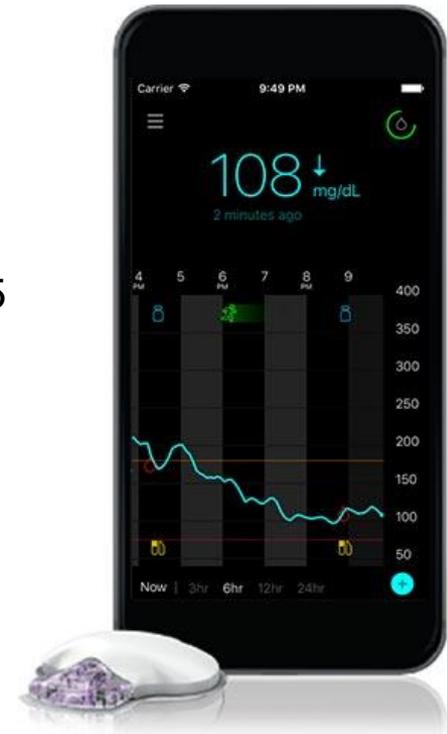
- Stand-alone CGM
- Continuous Glucose Monitoring
- Able to dose using CGM data
- No finger sticks required
- Do **NOT** have to scan!
- Updates glucose readings every minute
- Only can use with phone at this time**
- Available through DME
- 14-day wear
- Has alarms for highs or lows



***Check compatibility at: [HTTPS://FREESTYLESERVER.COM/Payloads/IFU/2022/q2/ART44628-004-rev-A-web.pdf](https://freestyleserver.com/Payloads/IFU/2022/q2/ART44628-004-rev-A-web.pdf)

Medtronic Guardian Connect

- Stand-alone CGM
- Fingertick (calibration) required every 12 hours
- 7-day wear
- Data sent directly from transmitter to apple device (patient must have apple device)
 - If sent to smart device, data can be followed from up to 5 iPhones or Android phones
 - Check for Android compatibility
- Does have alarms for highs and lows



*FDA approved for 14 y/o and older

Insurance Considerations for Sensors

- Check with insurance for coverage of CGM
- For Coverage contact:
 - Dexcom: Diabetes Team will send a prescription to a Specialty Pharmacy and if you are not covered under pharmacy benefits then Dexcom will contact you directly
 - Medtronic: Call: Ron Hoyer at 913.620.7447 or email: [Ron.j.hoyer@ Medtronic.com](mailto:Ron.j.hoyer@Medtronic.com)
 - Freestyle Libre: Call: 913.205.7276 or email: Brittany.benson@abbott.com

Missouri and Kansas Medicaid CGM Process

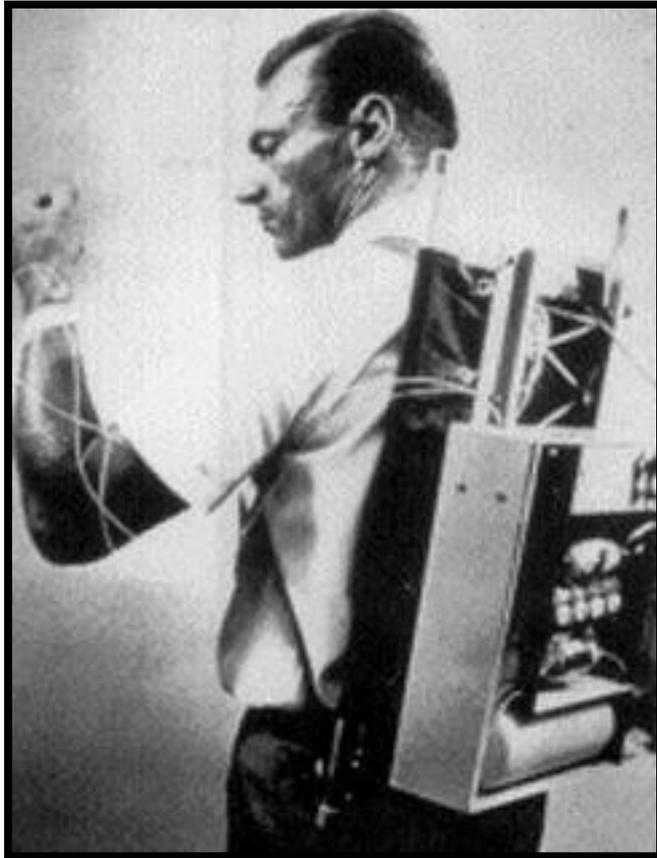
Let us know if you would like to start on a CGM

- **Mo Medicaid:** You will have to do at least 4 bg checks for the last 2 weeks
 - We will send over a Rx to your local pharmacy
- **KS Medicaid:** Call ADW at 877.241.9002 ext 2408 (Claudia) or ext 2405 (Dulce)
 - If you are on a pump or going to start on a pump Dexcom G6 will be approved
 - If you are not planning on getting on a pump- Freestyle Libre will be approved
 - Once we get notification (from ADW) that an account has been set up with ADW- We will send a Rx form with clinical notes to them



Pumps

The First Pumps: 1978



NO Long Acting Insulin While on a Pump

**YOU MUST REMAIN ATTACHED
TO INSULIN PUMP AT ALL
TIMES
(EVEN WHILE SLEEPING)**

Possible exceptions:

1. Showering or bathing
2. Swimming
3. Sports



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How the Insulin Pump Works:

Basal Insulin

- Basal Rate: constant flow background insulin
 - Replaces your long acting insulin
 - An insulin pump continuously gives rapid acting insulin in small doses.
 - Example: If on shots you take 24 units of Lantus, you would receive 1 unit of fast-acting insulin per hour on an insulin pump.
 - The basal rate can be adjusted to deliver different rates of flow throughout the day or night.



How the Insulin Pump Works:

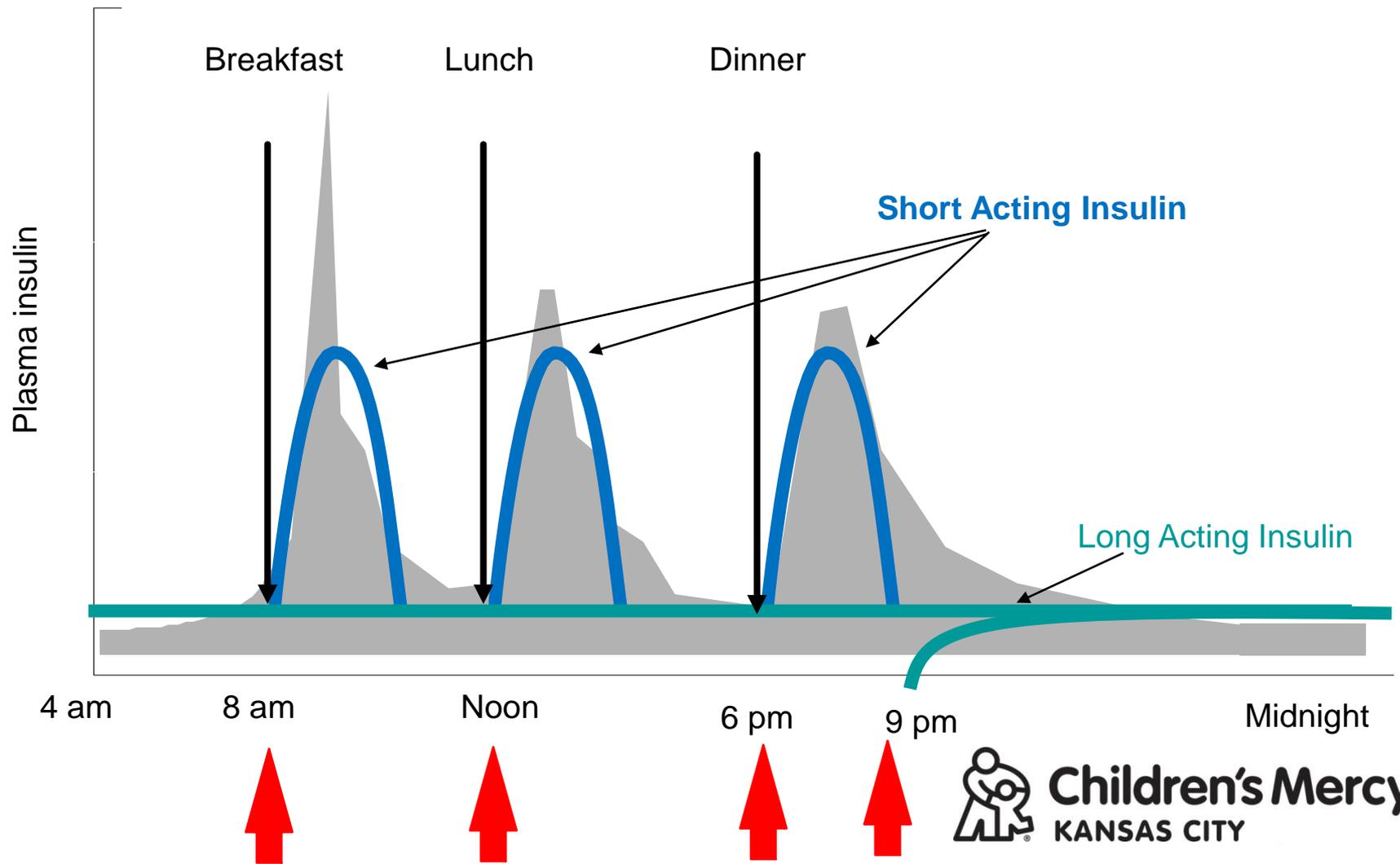
Bolus Insulin

- **Bolus** - dose given with meals, snacks, or glucose correction
 - Will calculate precise dose needed by entering BG and or grams of carbohydrate
 - Insulin delivered accurately with no extra injections
 - No fear of stacking insulin

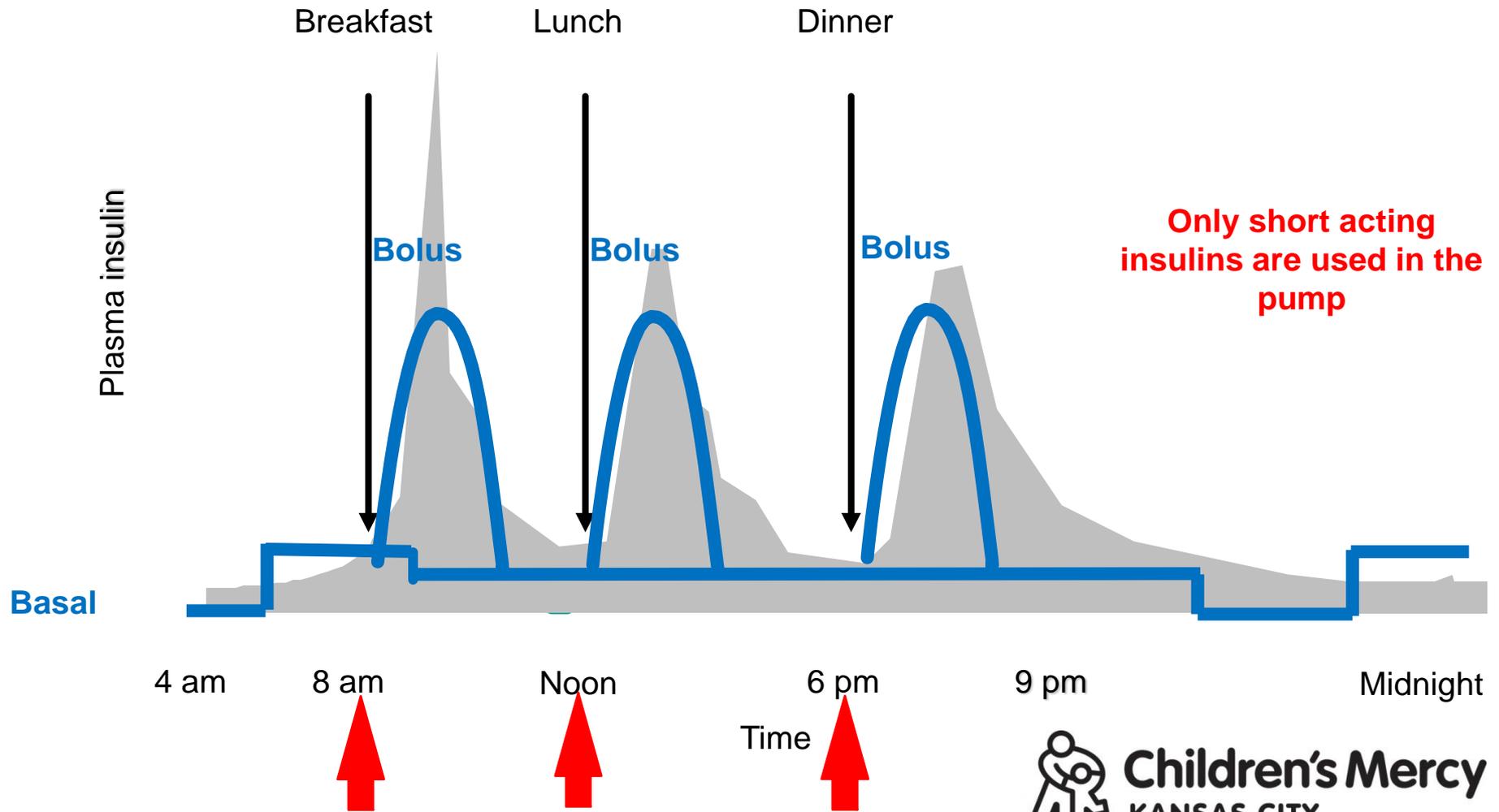


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Profile of Individual on Multiple Daily Injections



Profile of Individual on Insulin Pump Therapy





Tubed Insulin Pump

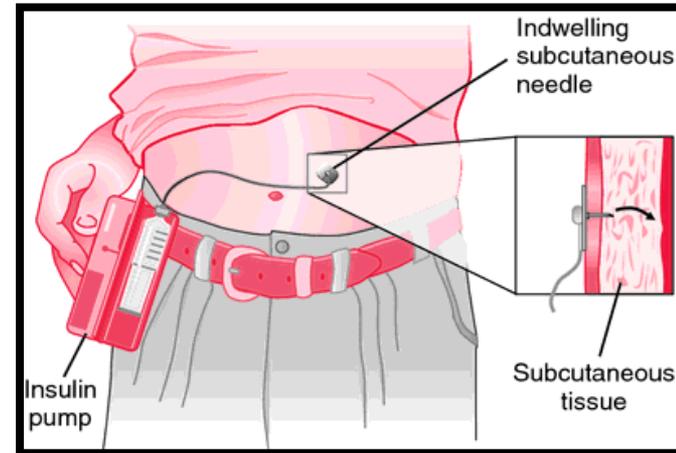
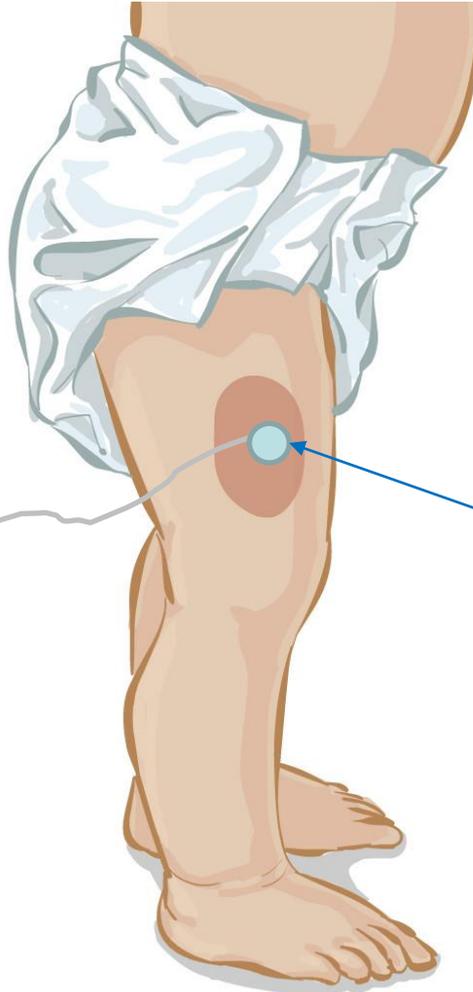


You fill the pump's "**reservoir**" with enough insulin to last you 2-3 days

- Tandem minimum: 110 units
- Medtronic: no minimum

Insulin Pump

Insulin travels into your body through a flexible tube that ends with a tiny cannula that is inserted under the skin and changed every 2-3 days at home.



An **infusion set** is held in place with a little adhesive patch stuck to your skin



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Medtronic MiniMed 630G or 670G or 770G



Minimed 630G

- Can be integrated with Guardian Link transmitter
 - Does not replace finger sticks, but limits them (minimum 2 BG's per day)
 - Suspends insulin when low predicted and restarts once BG is rising
- Capability to dose from meter (without Bolus Calculator)
- Waterproof
- Powered by an AA battery
- Minimum insulin fill: no minimum
- Holds up to 300 units insulin



* FDA approved for 8 y/o and older

Minimed 670G

- Can be integrated with the Medtronic Guardian sensor
 - Does not replace finger sticks, but limits them (minimum 2 BG's per day)
 - Auto mode adjusts basal every 5 minutes
 - A temporary exercise target of 150 mg/dl can be set
 - Must be 7 years old **and** use at least 8 units per day
- Several modes:



Pump only



Pump + CGM



Auto Mode

** Pump FDA approval for 7 y/o



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Minimed 770G

- Can be integrated with the Medtronic Guardian sensor
 - Does not replace finger sticks, but limits them (minimum 2 BG's per day)
 - Auto mode adjusts basal every 5 minutes
 - A temporary exercise target of 150 mg/dl can be set
 - Must be 2 years old **and** use at least 8 units per day
 - Alerts can be sent to up to 5 people
 - Uploads to Carelink Cloud every night
- Several modes:



Pump only



Pump + CGM



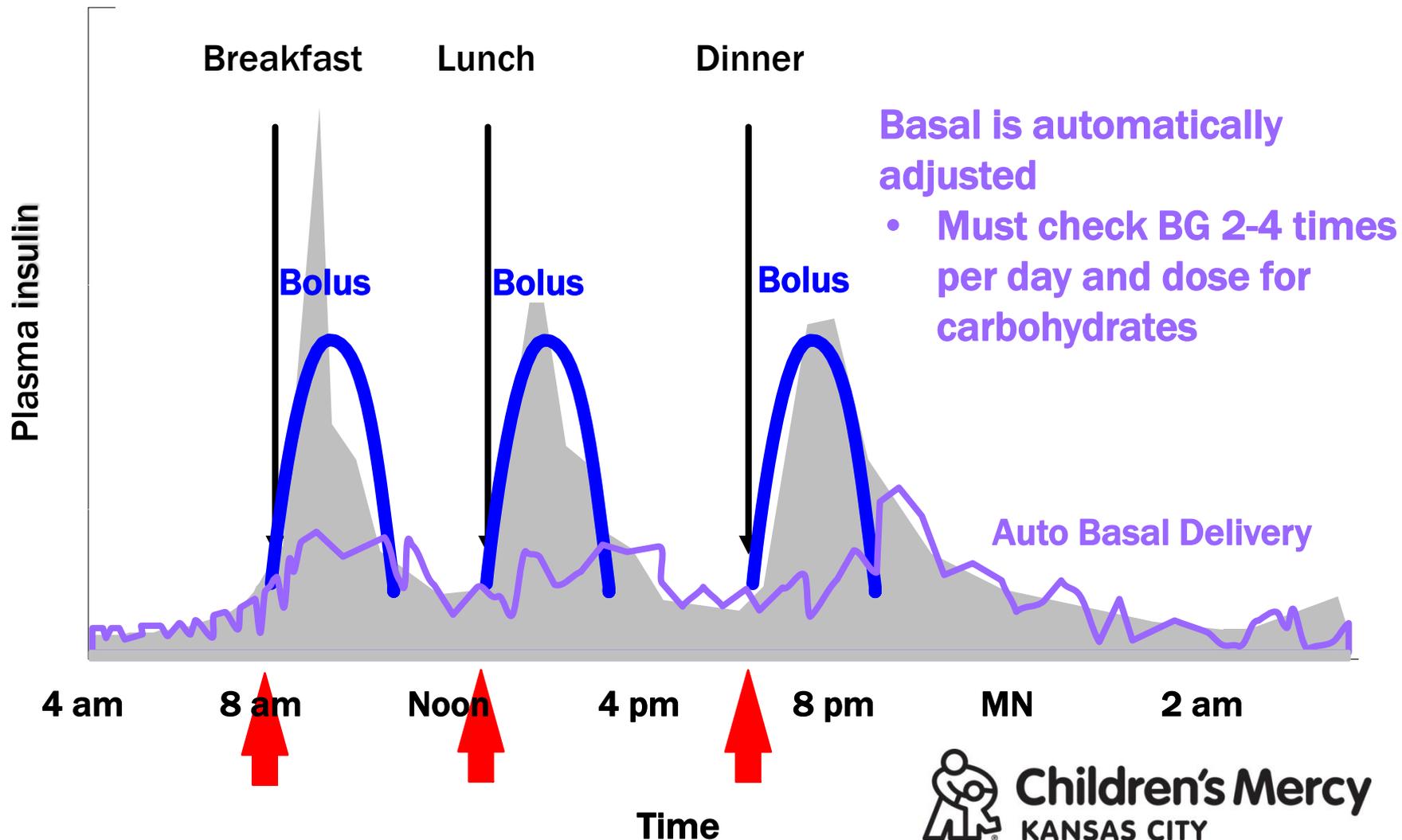
Auto Mode

** Pump FDA approval for 2 y/o



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Profile of Individual on Hybrid Closed Loop System



Tandem t:slim X2



Tandem t:slim X2

- Touch screen display
- Can integrate Dexcom G6 CGM
 - Able to dose using CGM data with no calibrations
 - Basal IQ or Control IQ
- Can also bolus through Tconnect mobile app
 - *With a compatible phone
- Able to plug in to computer and upgrade to newest pump software when available
- Powered by plugging into a USB
- Minimum fill is 110 units
- Holds up to 300 units



FDA approved for 6 y/o and older

* For compatibility see: <https://tandemdiabetes.com/landing-pages/remote-bolus>

Tslim X2 Control IQ

- Use with Dexcom G6 sensor
 - No calibrations (BG) needed- 2 hour warm up period when Dexcom G6 is first placed
 - Adjusts basals every 5 minutes as needed
 - Giving a correction bolus as needed – Auto correction bolus 1 every 60 minutes as needed
 - Must be 6 years old and have a total daily dose of 10 units **or** weigh greater than 55 pounds

**FDA approval for 6 y/o and older

Control IQ settings

If Sleep or Exercise Activities has not been enabled

  **Delivers**

Delivers an automatic correction if BG is predicted to be greater than 180 mg/dL

- It can give up to 1 correction bolus per hour as needed

 **B Increases**

Increases basal insulin if BG is predicted to be greater than 160 mg/dL

- It can adjust basals every 5 minutes as needed

 **B Maintains**

Maintains current basal settings

 **B Decreases**

Decreases basal insulin if BG is predicted to be less than 112.5 mg/dL

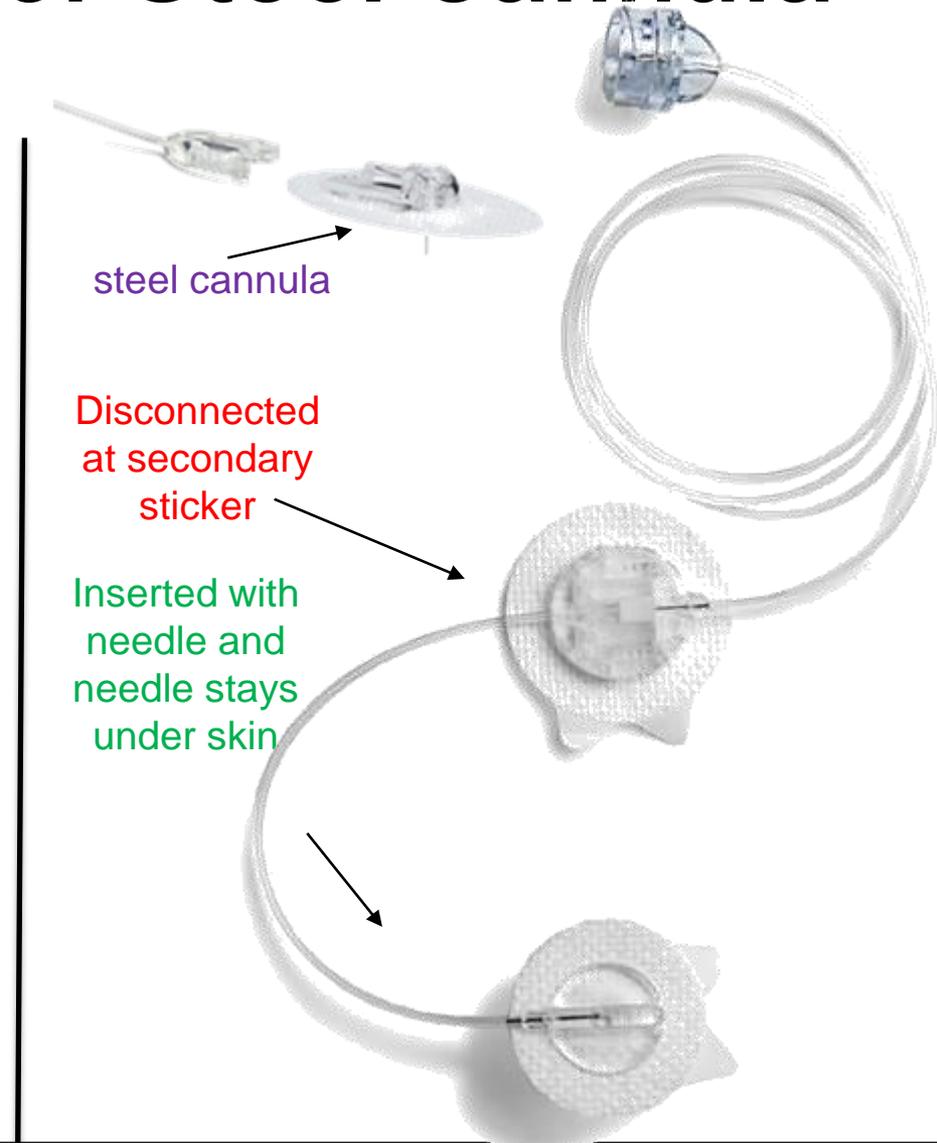
 **0 Stops**

Stops basal insulin if BG is predicted to be less than 70 mg/dL

Control IQ Algorithm features

- Sleep Activity:
 - Up to 2 profiles can be set up for different times
 - Set to a blood glucose goal of 110-120 mg/dL
- Exercise Activity:
 - Set a narrower and higher range bg goal of 150 mg/dL to reduce the likelihood of natural blood glucose drop during and following exercise

Infusion Set Options: Plastic Cannula or Steel Cannula

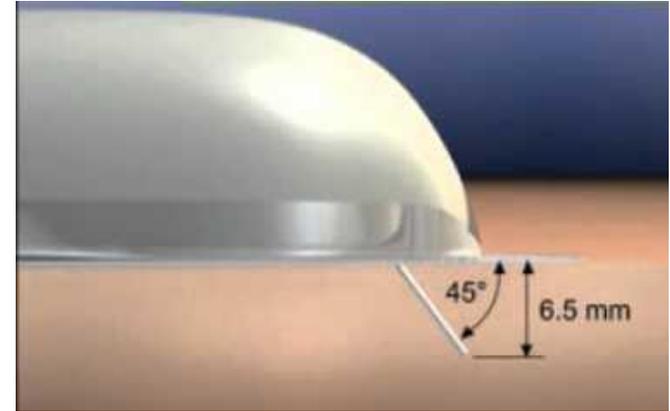
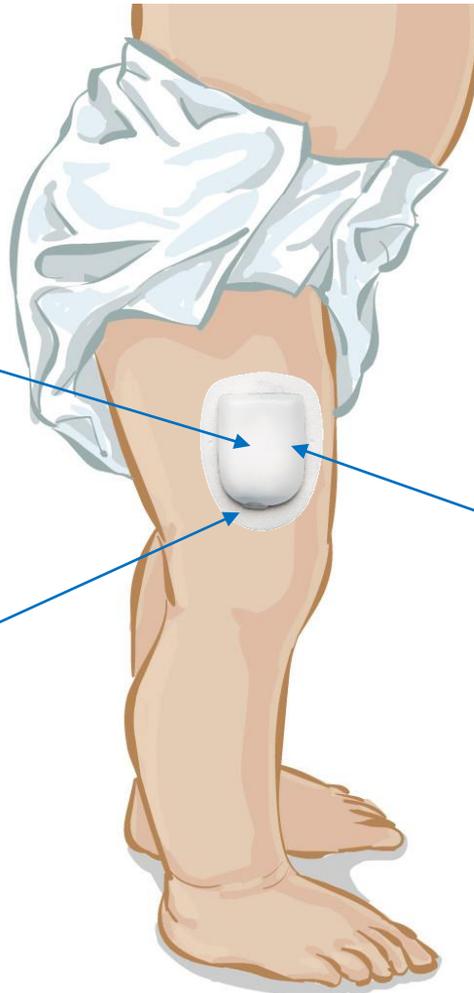


Tubeless Insulin Pump



You fill the pod's **reservoir**

- Minimum 85 units/3 days



Insulin travels through a tiny cannula inside the pod. Change every 3 days at home.

Pod
held in place by an adhesive patch stuck to skin

Insulet

Omnipod Eros, Omnipod Dash, Omnipod 5



Omnipod Eros

- No tubing
- Must have Personal Diabetes Manager (PDM) to give bolus
- Needle is never seen with insertion
- Pod is waterproof, PDM is not
- Powered by an AA battery
- Minimum insulin fill: 85 units
- Holds up to 200 units insi



Omnipod Dash

- No tubing
- Touch screen display
 - Bluetooth pod: data can be sent to cloud without uploading
 - Calorie king in bolus calculator
- Secondary iPhone Apps
 - “Display” lets user see their data
 - Includes “find my PDM” feature
 - “View” lets caregivers view data
- Must have PDM to give bolus
- Powered by plugging into a USB
- Minimum insulin fill: 85 units
- Holds up to 200 units insulin



** Special release -Not available for all areas**

Omnipod 5

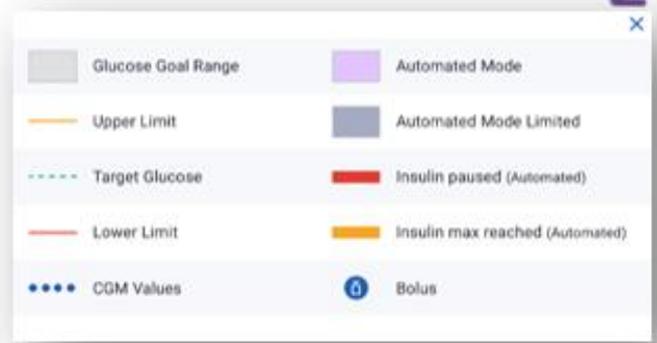


- No tubing
- For use with a Dexcom G6 sensor
- Can be controlled with Insulet provided PDM or compatible smartphone*
 - Must have one of the above to bolus
 - Must also have Dexcom G6 app on compatible phone. CAN NOT use the Dexcom receiver
- Must be within 5 feet of the app or controller for boluses, edits, status
- Touch screen display
 - Bluetooth pod: data can be sent to cloud without uploading
 - SmartBolus calculator
- Controller powered by plugging into a USB
- Minimum insulin fill: 85 units
- Holds up to 200 units insulin

*See Omnipod.com/compatibility for a list of compatible smartphones

FDA approval for 2 y/o and minimum 5 units per day

CGM Graph



Uses Glucose predicted 60 minutes in the future

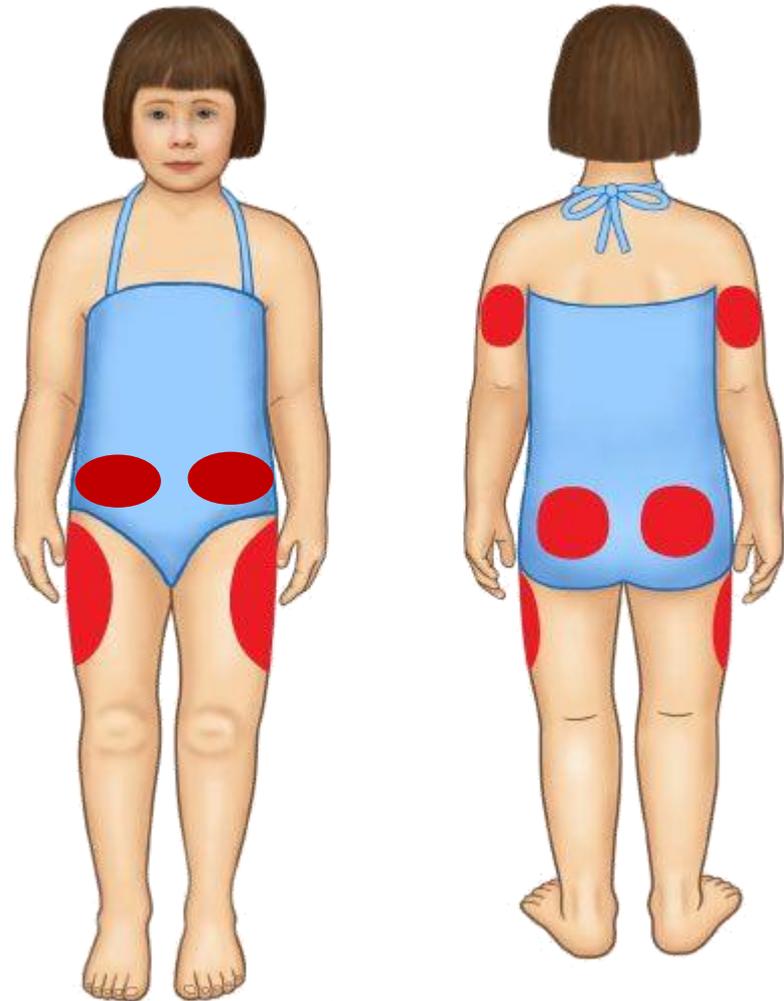
- Will always pause if glucose below 60 mg/dL
- Will increase and give micro-boluses if hyperglycemia is predicted above the user's customized target

Infusion Site Location Options

Can be placed anywhere an insulin injection can be given:

- Outer arm
- Abdomen
- Hip area
- Thigh

Rotate, Rotate, Rotate



Options for Wearing Pump



Common Pump Features

- Simple to use
- Low battery/insulin warning
- Downloadable to computer
- 24 hour helpline
- Training Included
- Child button lock-out
- 4 year warranty
- Internal safety checks
- Programmable reminders
- Bolus calculator

You Decide:



1. A pump with finger sticks



3. A pump with an integrated CGM
Use the CGM feature now, later, or never

2. A CGM with MDI
or with any of the pumps



4. Multiple Daily Injections
With finger sticks



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Choosing a Pump or Sensor

- Review individual pump/sensor packets
 - Contact individual pump reps listed on back
- Apply directly through the pump or sensor company if the device is FDA approved for your child's age- except Dexcom (we will place this order at CMH)



Insurance



- Approval
 - Does NOT happen overnight
- A 30 day – 6 month waiting period may be required
- Insurance requires regular follow up appointments or pump and sensor supplies could be denied. It is your responsibility to check with your individual insurance plans for specific requirements.
- Sensor and pump applications are separate
 - One, both, or neither may be covered
- 4-year pump warranty
 - In company upgrade may be available sooner

Missouri and Kansas Medicaid CGM Process

Let us know if you would like to start on a CGM

- **Mo Medicaid:** You will have to do at least 4 bg checks for the last 2 weeks
 - We will complete a Prior authorization (PA) and send it to MoMedicaid
 - We will send over a Rx to your local pharmacy- Once your PA is approved the pharmacy will be able to process it
- **KS Medicaid:** Call ADW at 877.241.9002 ext 2408 (Claudia) or ext 2405 (Dulce)
 - We will send a Rx form with clinical notes to ADW

Questions for the Pump/CGM company

1. Durable medical equipment
 - Will the supplies be covered?
2. “What are the out of pocket costs?”
 - How much specifically will I be paying per order
3. Payment plans
 - May be available through insurance or pump/CGM company



Thoughts Before Starting

- Always attached
 - You can't just "set it and forget it"
- There is a lot to learn in the beginning
- Check BG before meals and 2 hours after, also midnight and 3 am for the first few nights
- You will still be checking BG's
 - When sensors read low or do not match reported value
 - If not on Dexcom G6/Freestyle Libre
 - No calibrations are required
 - BG is suggested if blood glucose and symptoms do not match



Low Blood Glucose

How to treat when wearing a pump

low battery

- Immediately treat using 15/15 rule
- Set a temporary basal rates
 - Protects against lows
- Safety feature in pump
 - This will subtract off insulin or suspends pump in order to get back to target range
- Basal rates can be adjusted after exercise

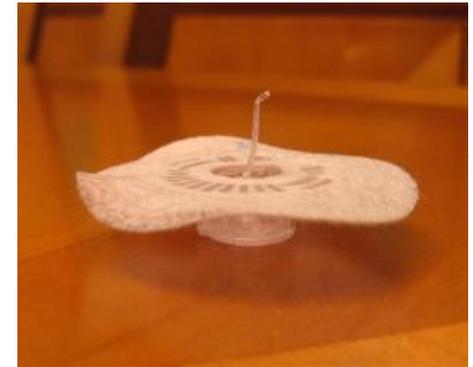


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High Blood Glucose

How to treat when wearing a pump

- Diabetic Ketoacidosis (DKA)
 - Can develop in 4-6 hours if delivery is interrupted
 - Kinks, battery failure, empty reservoir, bad site
- Moderate or large ketones
 - Must take injection
- Negative, trace, or small ketones
 - Can correct through pump



Glossary

- **Basal**: constant flow of insulin required in the body
- **Bolus**: dose with meals, snacks, or high BG correction
- **Insulin sensitivity factor**: number of points that one unit of insulin will lower BG
- **Target BG**: BG used as goal when calculating doses
- **Insulin On Board**: Algorithm within the pump to calculate active insulin working in the body
- **Reservoir/Cartridge**: vessel of insulin inside pump
 - Filled with enough insulin to last 2-3 days.
- **Infusion site**:
 - Delivers insulin under the skin
 - Connects insulin pump to user
 - Changed at home every 2-3 days

