

Diabetes Technology in the School Setting

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Objectives

- To learn insulin pump terminology
- To become familiar with each of the insulin pump brands
- To understand the school nurse's role in insulin pump management
- To learn how to troubleshoot hyper and hypoglycemia with an insulin pump
- To understand the school nurse's role in management of continuous glucose monitors

Insulin pump terminology

- **What is a basal rate?** The basal rate is the rate the insulin is delivered from the pump every hour. This a small dose of rapid acting insulin (Humalog, Novalog, Apidra) that takes the place of the child's Lantus, Levemir, or Basaglar. The rate is delivered slowly throughout the hour all day long.

Insulin pump terminology

- **What does bolus mean?** A bolus is insulin given for food eaten and/or a correction for a high blood sugar. All of the pumps can calculate a recommended dose based on the correction factor and insulin to carb ratio.
- **What is “sensitivity”?** Sensitivity is another word for correction factor. For example, with the formula $(BG-100)/50$, the sensitivity is 50. This will be programmed into the child’s pump to help correctly calculate insulin doses.
- **What is the “blood sugar target”?** The blood sugar target is the number we are trying to target or attain when we do correction doses. For example, with the formula $(BG-100)/50$, the target is 100.
- **What is the “insulin on board” or “active insulin”?** Insulin on board/active insulin time is the amount of time the insulin is active for in the child’s body. This is typically 3 hours after injection/bolus that the insulin continues to work. This time period is used to help calculate high blood sugar correction doses. It prevents over dosing or “insulin stacking” which can result in a low blood sugar after a correction is given.

Insulin pump terminology

- **What is an infusion set?** An infusion set is the point of insertion and insulin infusion into the body. The infusion set can also include tubing to connect the pump to the site on the body. Each pump has different infusion sets to choose from to meet each child's individual needs. The infusion set is changed every 72 hours.
- **What is a cartridge/reservoir?** A cartridge/reservoir is the part of the pump that insulin goes into. This is changed every 72 hours.

OmniPod

- Tubeless pump
- Pod has insulin reservoir and infusion set
- FreeStyle brand blood sugar meter built into the hand held device (PDM)
- Use PDM to give bolus
- PDM does not need to be with patient at all times- only when giving a bolus



Pod



Personal Diabetes Manager (PDM)

OmniPod

<https://www.myomnipod.com/learning-center/>



Animas

- 2 versions of pump
- Although not pictured, tube connects pump body to infusion site on child
- Child may or may not have meter that remotely connects to pump

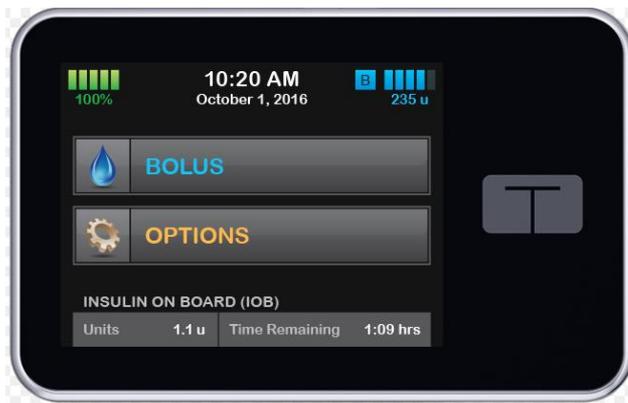


Animas

<http://www.animas.ca/guides>

T-Slim

- 2 versions of pump
- Although not pictured, tube connects pump body to infusion site on child
- Touchscreen

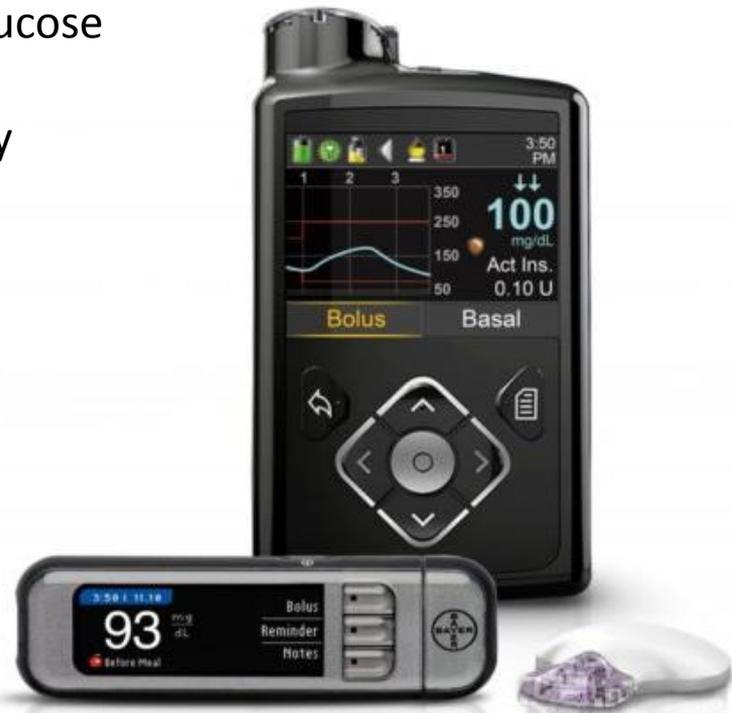


T-Slim

<https://www.tandemdiabetes.com/support/product-training>

Medtronic

- 2 versions of pump
- Although not pictured, tube connects pump body to infusion site on child
- Child may or may not wear continuous glucose monitor with pump
- May or may not have meter that remotely sends blood sugars to pump



Medtronic

<https://www.medtronicdiabetes.com/customer-support>

What you need to know

- How to give a bolus- each pump has this feature
 - Tell pump blood sugar value
 - Tell pump carbohydrate count
 - Pump will then calculate mealtime dose
 - You do have to confirm this dose on the pump and tell the pump to deliver dose.



Troubleshooting Hyperglycemia

- When a patient is on an insulin pump, you generally need to check for ketones at a blood sugar level of 250mg/dL
- If blood sugar is above 250mg/dL, give water
- If ketones are small, trace or negative, give a correction dose using the insulin pump.
 - Recheck blood sugars in 1 hour
 - If blood sugar has not come down 50 mg/dL, the infusion set will need to be changed, and a correction dose will need to be given with a pen or syringe.
 - If blood sugar has come down, continue to encourage water, and no further action with the pump is needed.

Troubleshooting Hyperglycemia

- If ketones are large or moderate, the student needs to give a correction dose with a pen or syringe
- The pump's infusion site needs to be changed
- Blood sugar should be checked in 2 hours, and ketones checked again in 4 hours

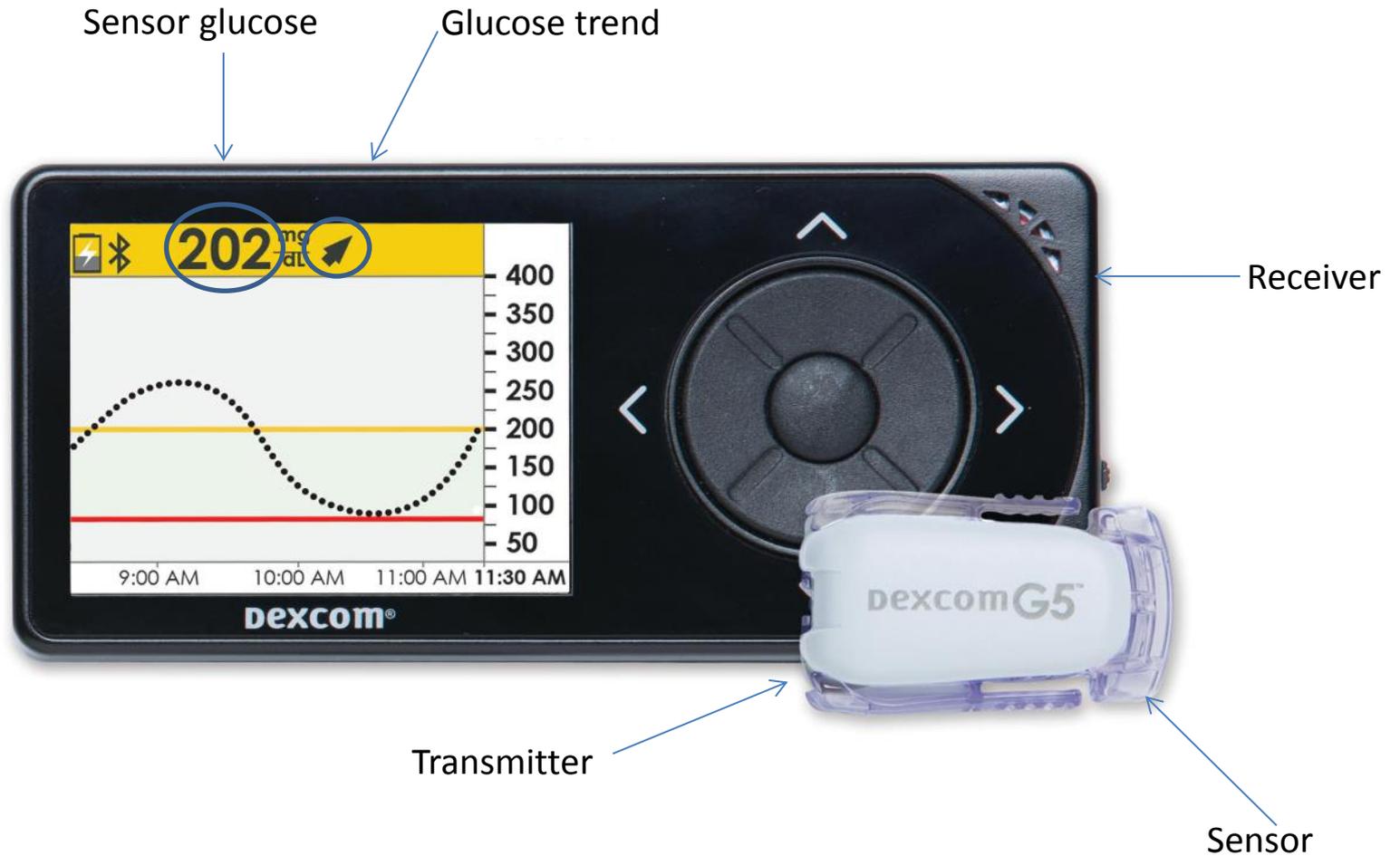
Troubleshooting Hypoglycemia

- All hypoglycemia should still be treated with 15grams of rapid acting carbohydrates such as 4 ounces of juice, glucose tablets, glucose gel, etc.
- You can disconnect a tubed pump at the infusion site for 30minutes to 1 hour. DO NOT leave pump disconnected for long than this.
 - DO NOT disconnect OmniPod from child's body for a low blood sugar. Use "temp basal" rate function

Continuous Glucose Monitors (CGM)



CGM



CGM

- Provides real time glucose information
- How does a CGM work?
 - Interstitial fluid glucose is checked every 5 minutes and transmitted to receiver.
 - User will calibrate the sensor every 12 hours to make sure that the sensor is reading the glucose level close to blood glucose level.
- Major focus placed on the trend arrow so you know the direction that the blood sugar is going



Information of school plan

SPECIAL MANAGEMENT OF INSULIN PUMP:

- ➔ Contact Parent in event of:
 - Pump alarms or malfunctions
 - Detachment of dressing / infusion set out of place
 - Leakage of insulin
 - Student must give insulin injection
 - Student has to change site
 - Soreness or redness at site
 - Corrective measures do not return blood glucose to target range within 2 hrs.
- ➔ Parents will provide extra supplies including infusion sets, reservoirs, batteries, pump insulin, and syringes.

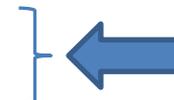
This student requires assistance by the School Nurse or Trained Diabetes Personnel with the following aspects of diabetes management:

- Monitor and record blood glucose levels
- Respond to elevated or low blood glucose levels
- Administer glucagon when required
- Calculate and give insulin Injections
- Administer oral medication
- Monitor blood or urine ketones
- Follow instructions regarding meals and snacks
- Follow instructions as related to physical activity
- Respond to CGM alarms by checking blood glucose with glucose meter. Treat using Management plan on page 1.
- Insulin pump management: administer insulin, inspect infusion site, contact parent for problems
- Provide other specified assistance:

This student may independently perform the following aspects of diabetes management:

Monitor blood glucose:

- in the classroom
- in the designated clinic office
- in any area of school and at any school related event
- Monitor urine or blood ketones
- Calculate and give own injections
- Calculate and give own injections with supervision
- Treat hypoglycemia (low blood sugar)
- Treat hyperglycemia (elevated blood sugar)
- Carry supplies for blood glucose monitoring
- Carry supplies for insulin administration
- Determine own snack/meal content
- Manage insulin pump
- Replace insulin pump infusion set
- Manage CGM



Diabetes resources

- Insulin pump and CGM websites:
 - Animas: <http://www.animas.ca/guides>
 - OmniPod: <https://www.myomnipod.com/learning-center/>
 - T-Slim: <https://www.tandemdiabetes.com/support/product-training>
 - Medtronic: <https://www.medtronicdiabetes.com/customer-support>
 - Dexcom: <https://www.dexcom.com/guides>
- Carbohydrate counting resources:
 - <http://www.calorieking.com/>
- General Diabetes resources
 - <http://www.jdrf.org/>
 - <http://diabetes.org/>



Questions?