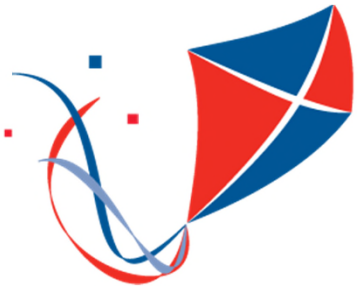

RANDALL CHILDREN'S HOSPITAL

LEGACY EMANUEL

Pumping Insulin in the School Setting

Julieann Finke, RD, LD, CDE

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Objectives

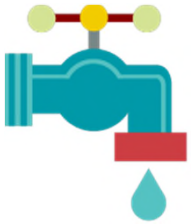
1. Understanding how insulin pump therapy works
2. Knowing the advantages and disadvantages of pump therapy
3. Managing insulin pump therapy in the school setting
    1. Bolusing
    2. Managing high blood sugar and ketones
    3. Treating lows
    4. Exercise tips
4. Recognizing resources available

Yes or No?
Raise Your Hand If You Agree

- With an insulin pump, rapid-acting insulin is used and replaces long-acting insulin.
- Insulin pumps don't track the timing of boluses, so insulin should not be given closer than every 3 hours.
- Checking for ketones when the blood sugar is high is even <u>more</u> important for pump users than those who are not.
- Each pump is so different that I need to know every detail about how to work it.
- Insulin pumps are intimidating.

How An Insulin Pump Works

- It mimics a normal pancreas by giving insulin in two ways:



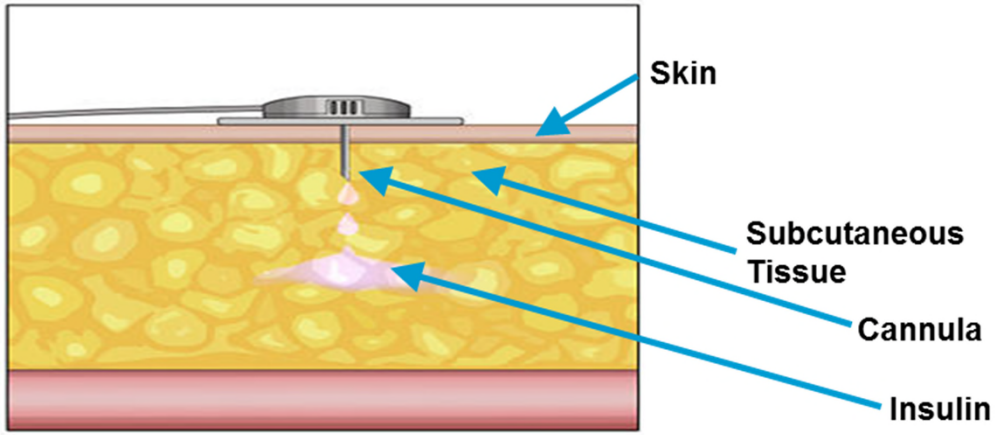
> **Basal Insulin** – the small amount of insulin delivered automatically by the pump throughout the day and night. It is the background insulin that keeps blood sugars stable overnight and between meals. This replaces the long-acting insulin (glargine or detemir).

> **Bolus Insulin** – insulin delivered by pushing pump buttons when eating and/or correcting a high blood sugar.

What Is An Infusion Set?

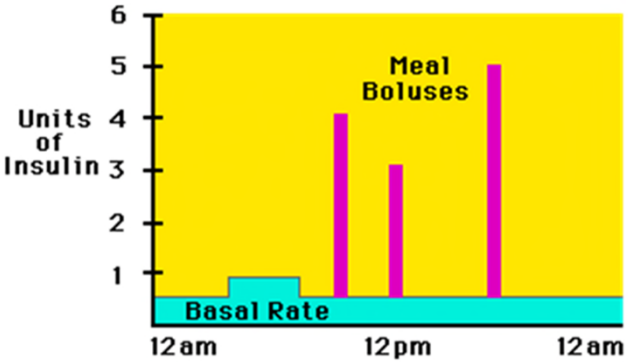
- A cannula (plastic or steel) is inserted into the subcutaneous fat. The set is attached to tubing which connects to the reservoir of insulin inside the pump.

http://www.youtube.com/watch?v=7jc4eubyZTI



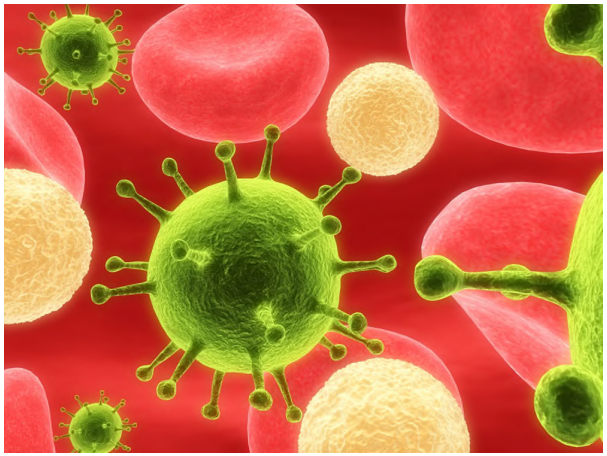
Advantages of Pump Therapy

- Improved glucose control
- Decreased total daily insulin dose
- More flexibility
- Less injections
- More independence
- More ways to fix issues
- Easy insulin delivery
- “Smart Pumps” calculate insulin doses for you
- “Insulin On Board” prevents insulin dose stacking
- “Custom Fit” basal rates
- Can use pump software to download the pump



Disadvantages of Pump Therapy

- Expense and insurance issues
- Possibility of skin infections at infusion site
- Increased risk of ketones/DKA
- 24 hour attachment
- Labor intensive process “feels like starting over”
- Different troubleshooting protocols than before
- Technical problems



All Pumps Are Similar

- Multiple ratios for carbs and correction factors can be programmed for different times of day.

- Active insulin time: the pump will recommend a reduced bolus amount if insulin has been given in the recent past to prevent stacking doses.

- Temporary basal rates: can be adjusted up or down depending on circumstances (illness, travel, exercise).

- Memory: the pump will not lose its settings if the battery is changed or goes dead.

The School Setting

- Embrace insulin pumps – they can make diabetes management *easier*!
  - > Pumps calculate the doses using formulas based on the blood sugar result and carbohydrate amount that is entered: no need to worry about math errors or delegating dose calculations to non-clinical support staff.
  - > Because the pump keeps track of how much insulin is active in the body, children can be dosed as often as needed. They are not limited to the "three hour rule" of keeping insulin doses apart.

- Don't concern yourself with the programming of the pump. That is up to the parents, physicians and educators.

What You Need to Know

- How to give a bolus
- How to troubleshoot high blood sugars and/or ketones
- How to treat hypoglycemia
- How to manage exercise

Bolusing

- A “bolus” is insulin given for carbohydrates and/or to correct a high blood sugar.

- Bolusing can be done at anytime during the day, in consultation with the parents/caregivers and physician/educator.

- How to give a bolus – Simple!
  - > Enter blood sugar
  - > Enter carbs (if eating)
  - > Deliver the dose recommended by the pump

Hyperglycemia (>300 mg/dL)

- Check for ketones, if possible. If ketone strips are not readily available, contact the parent to provide them. If not possible, follow the directions for negative ketones and proceed from there.
- If ketones are negative, give a bolus with the pump and recheck the blood sugar in 1-2 hours. Push carb-free fluids.
  - If the blood sugar comes down, all is well. Back to class and normal activities!
  - If the blood sugar doesn't come down…
    - Give a high sugar correction with a syringe or insulin pen
    - Change the infusion set/pod
    - Push fluids and recheck the blood sugar and ketones in 1-2 hours

Ketones

- If the ketones are positive, call the parent or our clinic if they are not available. The student will need the following:
  - > Insulin via syringe or insulin pen
  - > A new infusion set/pod
  - > Fluids
  - > Exercise Avoidance

Hypoglycemia

- Troubleshooting Hypoglycemia
  - For blood sugars <80 mg/dL use the 15/15 rule (15g fast-acting carb followed by a 15 minute blood sugar recheck)
  - If the blood sugar is still <80 mg/dL after two treatments, then suspend the pump or disconnect the infusion set while treating the low. Restart the pump/reconnect the infusion set when the blood sugar is >100 mg/dL.
  - Snacks are per parent discretion. However, a snack is usually only needed if they have bolused within the past 2-3 hours.
  - For severe hypoglycemia (loss of consciousness/seizure activity), use Glucagon as directed and suspend the pump or disconnect the infusion set. If at all possible, don't cut the tubing! Cutting the tubing will require the student to get new tubing. If it's not readily available – how will they get insulin when they eventually need it again?!

Exercise

- Confer with the parent to get specific directions about how they want exercise handled.

- How to manage exercise – so many options!!!
  - > Give a carbohydrate based snack
  - > Decrease the meal bolus if the exercise is following the meal
  - > Set a temporary basal rate
  - > Disconnect the pump from the infusion site (not for more than one hour)

- Be sure to communicate with the PE teacher and/or coach the student's plan for managing exercise.

Resources

- All pump companies have online learning modules.
  - > www.medtronicdiabetes.com
  - > www.animas.com
  - > www.myomnipod.com
  - > www.accu-chek.com
  - > www.tandemdiabetes.com

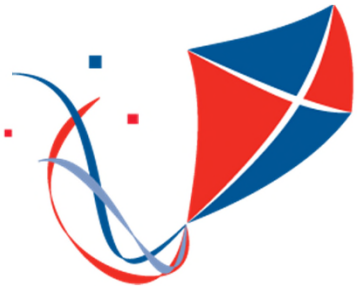
- You may have to create an account to access the modules, but anyone can view them.

- Animas offers webinars.

- YouTube

Pop Quiz Answers

- With an insulin pump, rapid-acting insulin is used and replaces long-acting insulin. ***True***
- Insulin pumps don't track the timing of boluses, so insulin should not be given closer than every 3 hours. ***False***
- Checking for ketones when the blood sugar is high is even <u>more</u> important for pump users than those who are not. ***True***
- Each pump is so different that I need to know every detail about how to work it. ***False***
- Insulin pumps are intimidating. ***They don't have to be!***



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Thank you!