Living with Diabetes

Diabetes Family Education: Part 2

Presented by: Nurse and Dietitian Educators

Seattle Children's
HOSPITAL · RESEARCH · FOUNDATION

PE3364
10/24

Patrick

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General housekeeping

- Bathrooms
- Interruptions
- Breaks
- Safety
- Food

2

Schedule for today

Morning:

- Nutrition and you
- Insulin dose calculations
- Sick days / ketone management
- Physical activity
- Diabetes quick care guide
- Blood glucose logs
- Expectations for follow-up care
- Pathways to diabetes technology
- Research

Afternoon:

- Meet with Child Life Specialist
- Meet with diabetes provider
- Wrap-up with nurse educator

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Connecting the dots…

Let's review your blood glucose and food logs:

- Do you see any connection between food and blood glucose numbers?
- When are your blood glucose numbers highest? What made them high?
- When are your blood glucose numbers lower? What made them lower?
- Did you have any blood glucose numbers under 70 mg/dL? What did you do?

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Flexibility with food

- Does this current way of eating suit you?
- What would make eating and food more enjoyable?
- Can you think of your favorite foods that you want to try?
- Is there an upcoming event or special occasion that you would like to plan for?
    - Examples: birthday, potluck, school pizza day, movie night

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Carb counting when eating outside of the home

Experienced-based carbohydrate counting:

1. Find similar food on food databases or apps
2. Estimate the portions compared to the amount listed on referenced apps / databases
3. Come up with similar estimates
4. Review your carb estimates based on the results of your next blood glucose check

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Carb counting home recipes

Let's work on your favorite recipe:

1. List out the ingredients and amount in the whole recipe
2. How many servings or portions will it make?
3. Find out the carbohydrate amount for each ingredient used
4. Add up all the carbohydrates
5. Divide total carbohydrates by the number of servings to find the carb amount for one portion

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More tools for recipes

Digital Scale

Phone Apps

MyFitnessPal

Nutrition Wizard

Glooko

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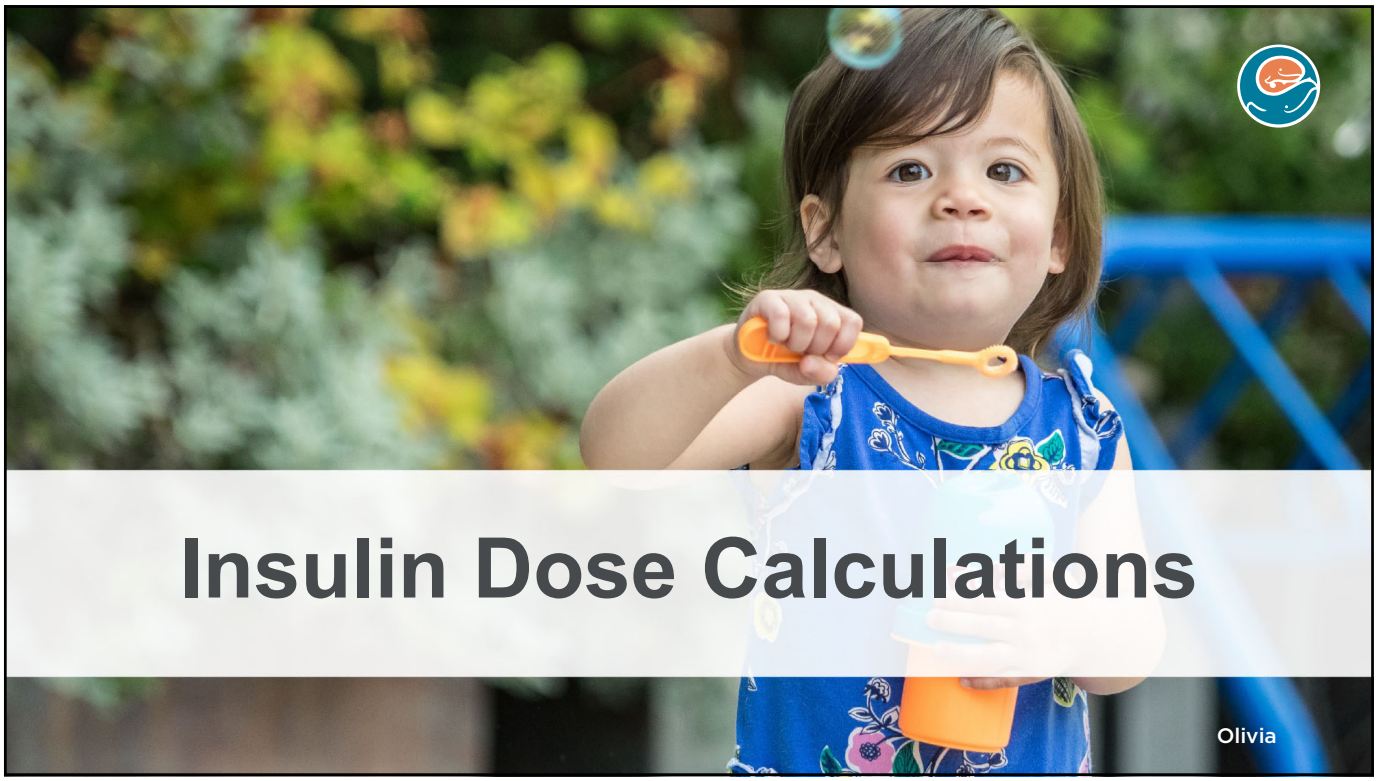

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Insulin dose calculations

You need rapid-acting insulin for two reasons:

1. Eating or drinking things with carbohydrates
2. Blood glucose is above range

See "Basal-Bolus Insulin: Long-Acting and Rapid-Acting Insulin Therapy" (PE1255) in Part 2 Handouts.

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Insulin dosing definitions

- **Insulin to Carb Ratio:**
  1 unit of insulin will cover ____ grams of carbs

- **Correction Factor:**
  1 unit of insulin is expected to lower the blood glucose by _____ mg/dL

- **Target Blood Glucose:**
  Based on age
  Different number for daytime and bedtime / overnight

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Insulin to carb ratio

Used to calculate the dose of rapid-acting insulin to cover carbs in food / drinks

$$\frac{\textit{Grams of carbs}}{\textit{Insulin to carb ratio}} = \textit{Carb dose}$$

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Correction factor

Used to calculate the dose of rapid-acting insulin to lower a high blood glucose

$$\frac{\textit{Current Blood Glucose} - \textit{Target Blood Glucose}}{\textit{Correction Factor}} = \textit{Correction Dose}$$

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Target blood glucose (BG)

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Putting it all together…

Meal _____

Carbs eating _____ ÷ _____ (carb ratio) = _____ Dose for food

\+

BG now _____ - _____ (target) = _____ ÷ _____ (correction factor) = _____ Dose for BG

Add insulin dose for food and BG together

Total insulin dose _____ **units**

Always round your final answer **DOWN** to the nearest half unit increment

See "Insulin Dose Calculations Worksheet" (PE3232) in Part 2 Handouts.

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Putting it all together…

Example: Insulin to carb ratio = 1:10 Correction Factor = 50 Target BG = 100 day / 150 night

Meal Breakfast

Carbs eating 60 ÷ 10 (carb ratio) = 6 Dose for food

\+

BG now 240 - 100 (target) = 140 ÷ 50 (correction factor) = 2.8 Dose for BG

Add insulin dose for food and BG together

Total insulin dose 8.8 **units**

8.8 units would round **DOWN** to 8.5 units of insulin

Always round your final answer **DOWN** to the nearest half unit increment

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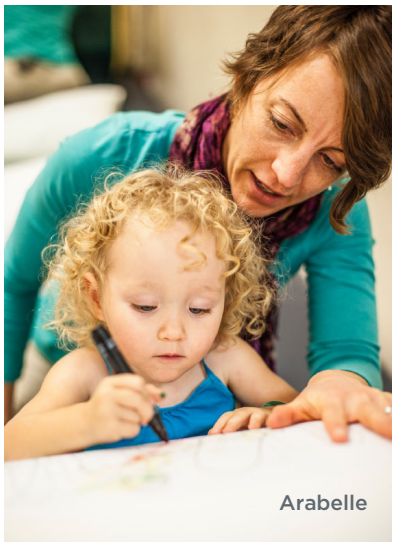
Putting it all together…



Your child's current insulin dosing is:

- Insulin to carb ratio (I:C) = _____
- Correction factor (CF) = _____
- Target blood glucose (BG) = _____ day / _____ night

Now let's do some practice problems together!

These doses will change at future clinic visits based on blood glucoses, A1c, growth, puberty and other factors

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3 hour "rule"

Do not give a correction dose for high blood glucose if it has been less than 3 hours since last Humalog/Novolog injection. Cover carbs only!

- This is important to prevent insulin stacking of Humalog/Novolog that can lead to low blood glucose
- Humalog/Novolog is working to lower glucose in the body for 3 hours

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3 hour "rule"

Example:

Time	BG	Carb Dose	Correction Dose
Breakfast 8:00AM	280	Yes	Yes
Snack 10:00AM	170	Yes	No, it has only been 2 hours since last Humalog/Novolog injection
Lunch 12:00PM	218	Yes	No, it has only been 2 hours since last Humalog/Novolog injection
Snack 3:00PM	298	Yes	Yes, it has been at least 3 hours since last Humalog/Novolog injection and glucose is high
Dinner 5:00PM	236	Yes	No, it has only been 2 hours since last Humalog/Novolog injection
Bedtime 9:00PM	315	No, not eating	Yes, it has been at least 3 hours since last Humalog/Novolog injection and glucose is high. Use bedtime target BG to calculate dose.
Overnight 2:00AM	125	No, not eating	No, glucose is in-range so no correction dose is needed

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Frequently asked questions about insulin dosing

Question #1:

I calculated my child's insulin dose for breakfast and I got an answer of 3.9 units. Can I just round up to 4 units?

- We teach you to round DOWN to reduce the risk of low blood glucose from too much insulin
- You would round DOWN to the nearest half unit increment, which would be 3.5 units

Question #2:

My child's blood glucose at bedtime is 130 mg/dL. Their night time target is 150 mg/dL. Do I need to feed them uncovered carbs to get their blood glucose at or above 150 mg/dL before they can go to sleep?

- No, your child can go to sleep with a blood glucose of 130 mg/dL
- The night time target is only used for dose calculations when correcting high blood glucose at bedtime/overnight; your child does not have to be at or above the night time target before going to sleep

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Frequently asked questions about insulin dosing

Question #3:

My child's blood glucose at 3:00AM is above their night time target BG. I calculated a correction dose of insulin and I got an answer of 0.3 units. Do I give any insulin?

- No, anything less than 0.5 units would round DOWN to 0 units of insulin. Your child can go back to sleep!

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Ketones: the basics

What are ketones?

- A waste product of fat breakdown
- When our bodies don't have enough insulin to move glucose into the cells for energy, our bodies breakdown fat for energy instead

Why check for ketones?

- Ketone checking is VERY important!
- High levels of ketones in the body can result in diabetic ketoacidosis (DKA), which can make you very sick and if left untreated can lead to death

See "Sick Days/Ketone Management" (PE3233) in Part 2 Handouts.

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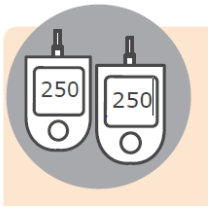
Ketones: when and how to check

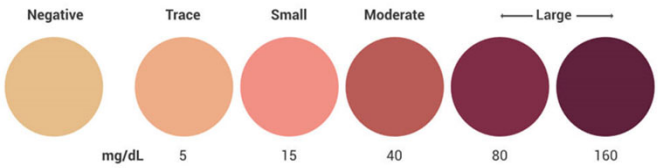
When to check for ketones?

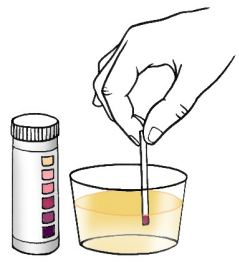
- If blood glucose is above 250 mg/dL twice in a row, or if over 300 mg/dL for more than 3 hours.
- Your child is sick, regardless of the blood glucose levels
- Your child is vomiting or nauseous



How to check for ketones?

- Most common method is checking urine ketones





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Ketones: Dosing Table

Ketone level	Action to take
Negative, Trace or Small	**If blood glucose is above range:** • Give **usual** correction dose for high blood glucose • Drink extra water • Check blood glucose and ketones every 3 hours until ketones are negative
Moderate	**If blood glucose is above 200 mg/dL:** • **Give usual correction dose x 1.5 = insulin dose to give** • Drink extra water • Check blood glucose and ketones every 3 hour and give corrections until ketones are negative **If blood glucose is under 200 mg/dL:** • Give sugary liquids like Gatorade (do not cover with insulin) • Recheck blood glucose every 15 minutes until blood glucose is above 200, and then give extra insulin for moderate ketones.

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Ketones: Dosing Table

Ketone level	Action to take
Large	**If blood glucose is above 200 mg/mL:** • **Give usual correction dose x 2 = insulin dose to give** • Drink extra water • Check blood glucose and ketones every 3 hours and give corrections until ketones are negative **If blood glucose is under 200 mg/mL:** • Give sugary liquids like Gatorade (do not cover with insulin) • Recheck blood glucose every 15 minutes until blood glucose is above 200, and then give extra insulin for large ketones.

- Please refer to the **"Sick Days/Ketone Management" handout** in the Appendix section for instructions on dosing extra insulin for ketones
- Please call the **diabetes urgent pager** for help with insulin dosing if you are unsure what to do **(206-987-2000)**

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Ketones: how to treat

If ketones are negative, trace or small:

- Drink extra water
- Give normal correction dose of insulin if blood glucose is high

If ketones are moderate or large:

- Drink extra water
- **Your child will need extra insulin to clear the ketones**
- Please refer to the **"Sick Days/Ketone Management" handout** in the Appendix section for instructions on dosing extra insulin for ketones
- Please call the **diabetes urgent pager** for help with insulin dosing if you are unsure what to do **(206-987-2000)**

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When your child with diabetes is sick

What can happen?

- Blood glucose levels may rise due to the body's stress response of illness
- Ketones can develop, even with normal glucose levels
- More insulin may be needed to prevent or treat ketones

What should I do?

- Keep your child well hydrated
- **Monitor glucose and ketone levels every 3 hours**
- Please refer to the **"Sick Days/Ketone Management" handout** in the Appendix section for additional guidelines on managing Sick Days with diabetes

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What do you do if…

Scenario #1:

Your child wakes up in the morning and says they are not feeling well and that their stomach is upset.

- Check blood glucose and ketone levels
- Review “Sick Days/Ketone Management” handout to see if additional insulin is needed
- Continue to check blood glucose and ketone levels every three hours until your child feels better and ketones are negative

Scenario #2:

Your child is sick and has large ketones. Their blood glucose is 150 mg/dL.

- Give carbohydrates (without insulin) to get the blood glucose above 200 mg/dL so extra insulin can be given for the large ketones
- Once blood glucose is above 200 mg/dL, give double the normal correction dose for the large ketones
- Continue to check blood glucose and ketones every 3 hours while your child is sick

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Physical activity guidelines

- Physical activity generally lowers blood glucose
- Type of activity, duration, and intensity affect blood glucose levels
- It is important to check your child's blood glucose before, during, and after physical activity

General guideline:

Eat 15g of carbs (without insulin) for every 30 to 60 minutes of physical activity

See "Exercise Checklist" (PE2623) in Part 2 Handouts.

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Unplanned versus planned activity

Unplanned activity

- Eat a 15g snack without insulin
  (depending on pre-activity glucose level)

Planned activity

- If going to be active within 1 to 2 hours after a meal or snack you can subtract 15g from the total carb count that you dose insulin for

  Example: 60g – 15g = 45g

  only dose for 45g due to anticipated activity

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What do you do if…

Scenario #1:

You and your child are going on a 1 hour bike ride. You check their blood glucose before leaving and it is 155 mg/dL.

- Have your child eat a 15g snack (without insulin) in anticipation of the activity
- Bring BG meter, Medical ID, extra snacks and water with you on the bike ride
- Check blood glucose in 30 minutes and eat another 15g snack if blood glucose is dropping

Scenario #2:

Your child has been invited to the neighbor's house to jump on the trampoline. You check their blood glucose beforehand and it is 75 mg/dL.

- Have your child eat/drink 15g of fast-acting carb (without insulin) since blood glucose is borderline low
- Recheck blood glucose in 15 minutes to make sure the blood glucose is going up before starting activity
- Once blood glucose is above 100 mg/dL, give your child an additional 15g snack with protein and fat (without insulin). Check blood glucose again in 30 minutes.

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What do you do if…

Scenario #3:

Your child wants to go to the park and play on the playground. You check their blood glucose before leaving and it is 280 mg/dL.

- Check for ketones since the blood glucose is above 250 mg/dL before activity. If ketones are moderate or large they should not exercise. Follow guidelines in the "Sick Days/Ketone Management" handout.
- Your child does not need to eat a snack prior to activity with an elevated blood glucose of 280 mg/dL. Check blood glucose in 30 minutes to see if it is coming down on its own with the activity.

Scenario #4:

Your child is playing in a competitive soccer game. Their blood glucose was 180 mg/dL at half time, but after the game the blood glucose has spiked up to 350 mg/dL without any carbohydrate intake.

- The sharp rise in blood glucose is likely due to an adrenaline response from the game. Give at least half correction for high blood glucose after exercise as it may drop on its own over the next few hours.

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Diabetes Care Quick Guide
Olivia

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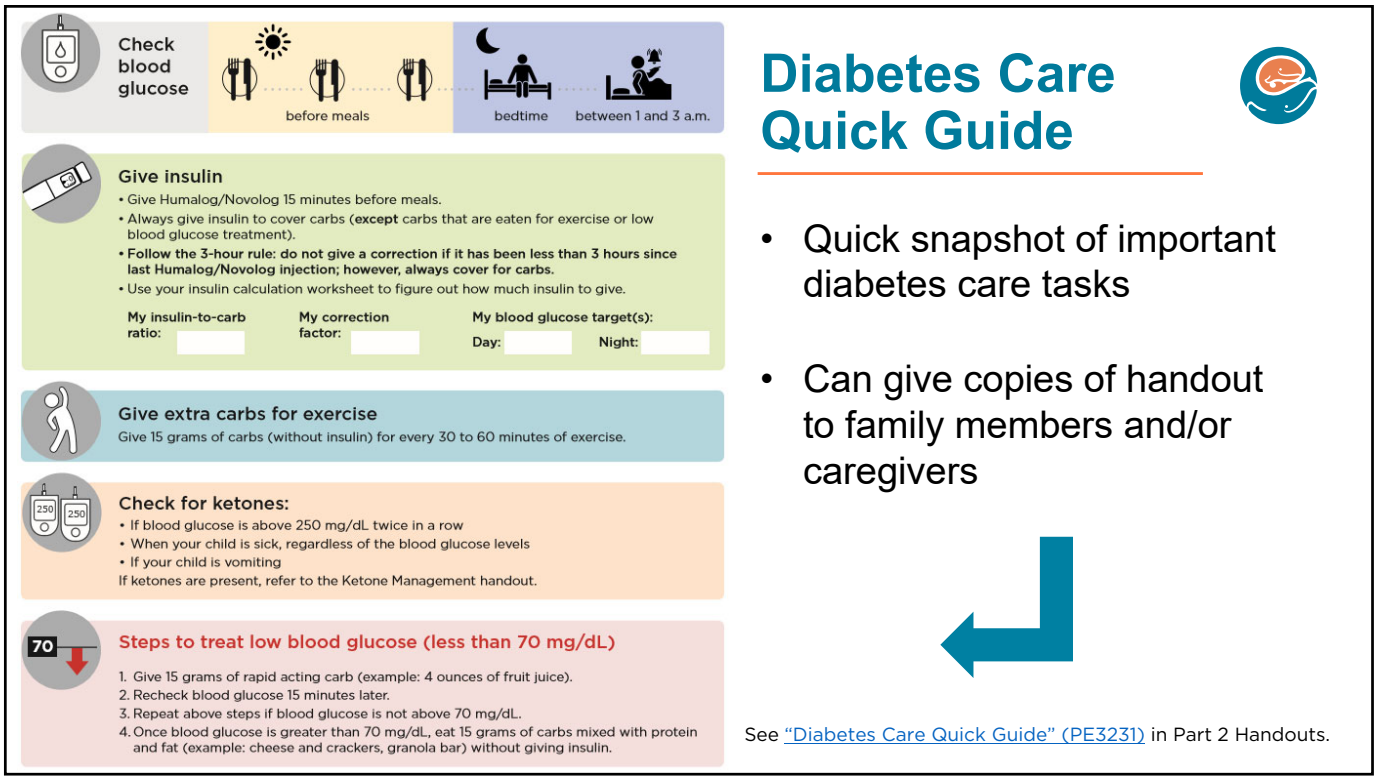
Check blood glucose
before meals
bedtime
between 1 and 3 a.m.
Give insulin
• Give Humalog/Novolog 15 minutes before meals.
• Always give insulin to cover carbs (except carbs that are eaten for exercise or low blood glucose treatment).
• Follow the 3-hour rule: do not give a correction if it has been less than 3 hours since last Humalog/Novolog injection; however, always cover for carbs.
• Use your insulin calculation worksheet to figure out how much insulin to give.
My insulin-to-carb ratio:
My correction factor:
My blood glucose target(s):
Day:
Night:
Give extra carbs for exercise
Give 15 grams of carbs (without insulin) for every 30 to 60 minutes of exercise.
Check for ketones:
• If blood glucose is above 250 mg/dL twice in a row
• When your child is sick, regardless of the blood glucose levels
• If your child is vomiting
If ketones are present, refer to the Ketone Management handout.
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Steps to treat low blood glucose (less than 70 mg/dL)
1. Give 15 grams of rapid acting carb (example: 4 ounces of fruit juice).
2. Recheck blood glucose 15 minutes later.
3. Repeat above steps if blood glucose is not above 70 mg/dL.
4. Once blood glucose is greater than 70 mg/dL, eat 15 grams of carbs mixed with protein and fat (example: cheese and crackers, granola bar) without giving insulin.
Diabetes Care Quick Guide
• Quick snapshot of important diabetes care tasks
• Can give copies of handout to family members and/or caregivers
See "Diabetes Care Quick Guide" (PE3231) in Part 2 Handouts.

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Blood Glucose Log

Current Dose	Example	Dose	Current Dose	Example	Breakfast	Lunch	Dinner	Comments
Lantus dose a.m.	12		Carb Ratio	*1/20*				
Lantus dose p.m.	12		Correction Factor	*1/50*				
			Target BG	*120*				

Date:

	12 a.m.	3 a.m.	6 a.m.	7 a.m.	8 a.m.	9 a.m.	10 a.m.	11 a.m.	12 noon	1 p.m.	2 p.m.	3 p.m.	4 p.m.	5 p.m.	6 p.m.	7 p.m.	8 p.m.	9 p.m.	10 p.m.	11 p.m.
Blood Glucose:																				
Carbohydrates:																				
Insulin:																				

Parent comments

Date:

	12 a.m.	3 a.m.	6 a.m.	7 a.m.	8 a.m.	9 a.m.	10 a.m.	11 a.m.	12 noon	1 p.m.	2 p.m.	3 p.m.	4 p.m.	5 p.m.	6 p.m.	7 p.m.	8 p.m.	9 p.m.	10 p.m.	11 p.m.
Blood Glucose:																				
Carbohydrates:																				
Insulin:																				

Parent comments

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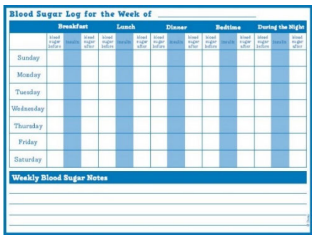
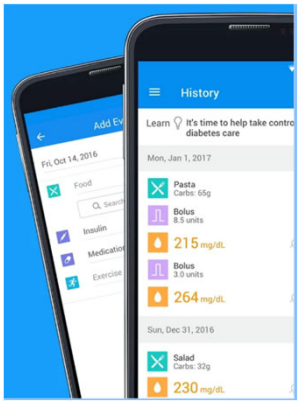
Different ways to log information

BG Meter Apps

Logbook



Glooko App



SCH Excel Log

Current Dose	Example
Lantus Dose AM	12
Lantus Dose PM	12

Current Dose	Example	Breakfast	Lunch	Dinner	Comments
Carb Ratio	1/20				
Correction Factc	1/50				
Target BG	120				

Date																			
	12A	3A	6A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
Blood Glucose																				
Carbohydrates																				
Insulin																				

Parent Comments:

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Honeymoon period

- Shortly after diagnosis the remaining beta cells can continue producing insulin for a temporary period of time
  - Insulin production varies in quantity and duration from person to person
  - Likely need to inject less insulin during this time
  - **May need more frequent insulin dose adjustments**
- This does not necessarily happen to *every* person with Type 1 diabetes

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Diabetes clinic follow-up

- First diabetes team visit in 2 to 4 weeks
  - Expect a longer visit
  - Will see provider, nurse, dietitian and social worker
- Follow-up appointments every 3 months
  - Bring blood glucose meter to all appointments
  - Visit with provider and diabetes nurse educator
  - Diabetes team visit once per year or as needed
  - Small finger poke to measure Hemoglobin A1c level

See "Why the Diabetes Team Visit?" (PE2419) in Part 2 Handouts.

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Hemoglobin A1c

- Average blood glucose over the past 3 months
  - Measures the amount of glucose that attaches to hemoglobin on red blood cells
- Recommended goal is less than 7% for those under 18 years old
  - Well-controlled diabetes reduces risk for potential long-term complications from diabetes

HbA1c %	Average BG (blood glucose) glucometer readings measured in milligrams per deciliter of blood (mg/dl)	
5%	97	GREEN (in recommended range)
6%	120	
7%*	150	
8%	180	YELLOW (above range – consider changes)
9%	210	
10%	240	RED (above range – changes needed)
11%	270	
12%	300	
13%	330	
14% and above	360 and above	

See "About Hemoglobin A1c" (PE1517) in Part 2 Handouts.

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How can I lower my HbA1c?

- It takes about 3 months to see a change in your A1c number. Practice these daily habits to stay in better control:
  - Check blood glucose 4 to 5 times per day.
  - Take insulin as prescribed.
  - Follow the meal plan given by your diabetes dietitian.

Use these as a guide for dosing your insulin before meals:

10 minutes before eating if BG is in the **100s**

20 minutes before eating if BG is in the **200s**

30 minutes before eating if BG is in the **300s**

40 minutes before eating if BG is in the **400s**

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How to contact us between clinic visits

Diabetes nurses are available by phone or MyChart for non-urgent concerns

Please include your child's name and date of birth in your messages

General questions

206-987-2640

Monday – Friday
7 a.m. to 4:30 p.m.

- Insulin dos adjustments (choose option 3)
- Prescription refills (choose option 3)
- School forms
- To talk to a Registered Nurse (choose option 4)

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How to contact us between clinic visits

Diabetes team is available 24/7 for urgent concerns

Urgent questions

206-987-2000

24/7

Ask the operator to page the diabetes team for you

- Completely out of insulin
- Gave too much or too little insulin
- Gave the wrong insulin (example: Humalog vs. Lantus)
- Insulin pump problems that you or the pump company can't fix
- Low blood glucose (under 70) and not responding to treatment
- Moderate to large ketones that continue after treatment. Follow the steps in the "Ketone Management Guidelines" handout for how to treat moderate to large ketones.

Emergency

Call 911 or go to the emergency department

- Glucagon/Baqsimi has been given
- Presence of large ketones with one of the following:
  - Chest heaviness
  - Vomiting more than twice in 2 hours
  - Trouble breathing
  - Change in mental state

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Type 1 Diabetes Screening

Higher risk of type 1 diabetes (T1D) if:

- Family history of T1D
- Personal or family history of other autoimmune diseases, including celiac disease and some thyroid disorders

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Type 1 Diabetes Screening

Screening includes lab testing blood work for T1D antibodies:

- With primary care provider (typically covered by insurance plans)
- Trialnet (no cost)
- Ask (no cost)

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Positive Screening

- If your family members screen positive, there are options to help delay the onset of clinical T1D
- For patients under 21 years old, referral to Seattle Children's endocrinology is indicated

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What is Continuous Glucose Monitoring?

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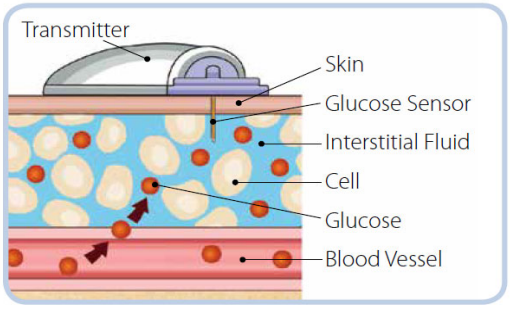
Continuous Glucose Monitors (CGM)

CGM measures the glucose in the interstitial fluid. The transmitter sends the information to the receiver/pump/phone. If used with an automated pump the pump will then adjust insulin based off the CGM information



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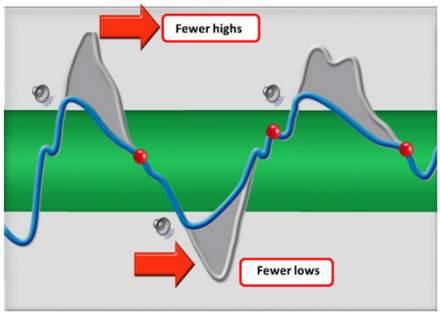
Benefits of Continuous Glucose Monitors

- Better glucose control through identification of trends (reveals what finger pokes can miss)
- Alerts for highs and lows
- When used in conjunction with an automated pump can improve time in range



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Continuous Glucose Monitoring (CGM)

Brands that currently work with insulin pumps:

Medtronic Guardian 4

Dexcom G6 and G7

Freestyle Libre 2+ (Tandem Only)

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Continuous Glucose Monitoring (CGM)

- What CGM model you choose today can affect the time frame for getting the pump model of your choice
  - Pumps are compatible with different CGM models
  - Insurance may not allow switching CGM brands right away
- You do not have to choose a CGM today.

Please let us know via MyChart once you have decided on the CGM that best meets your family's need.

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What is Insulin Pump Therapy?

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How do pumps work?

Tries to be how a pancreas without diabetes delivers insulin, it delivers small doses continuously (basal rate) and variable or manual doses (bolus rate)




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What do pumps look like on the body?

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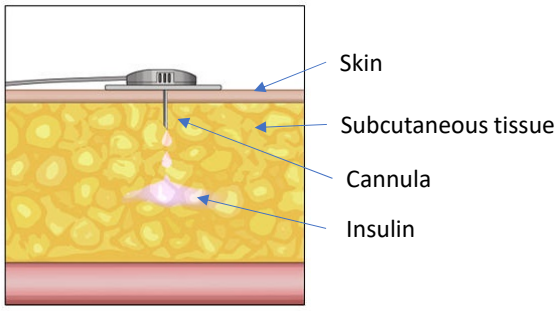
How does a pump deliver insulin?



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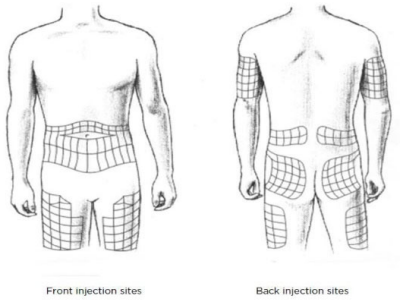
Where do infusion sets or pods go?

- Pump infusion sets or pods can be inserted in the same areas of the body that injections are done
- Rotation is very important!



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Which insulin is used in a pump?

Rapid acting insulin is the only type of insulin used in the pump
Humalog/Novolog

NO Lantus/Basaglar/Tresiba is used in the pump!

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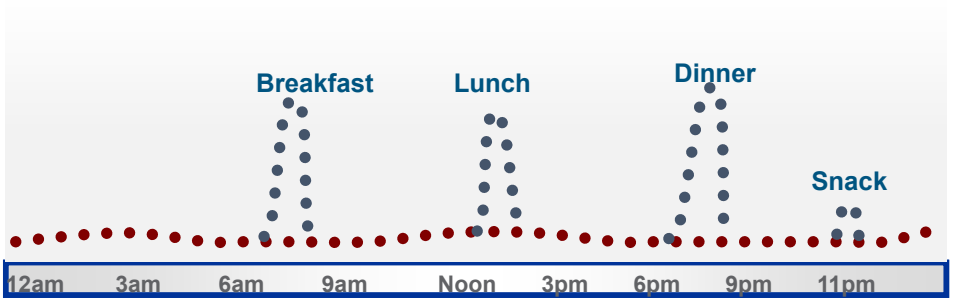
Review

Basal insulin: "background" insulin, delivered continuously

Bolus insulin: burst of insulin given to cover carbs or treat high blood sugar



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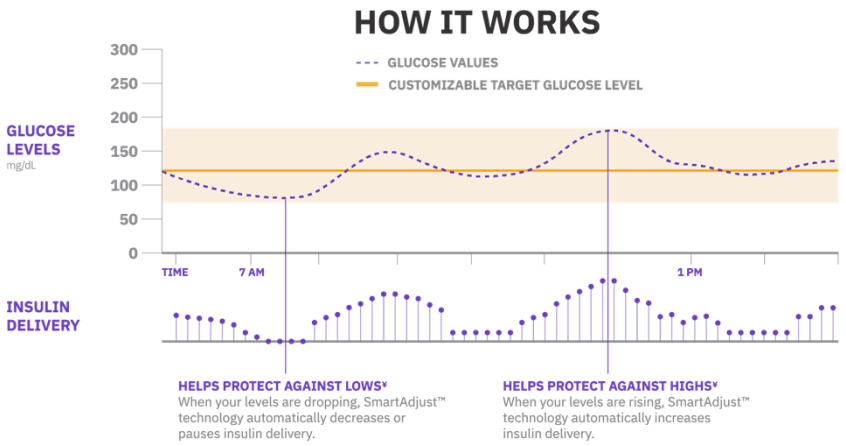
Automation



Graph from automated Omnipod system: omnipod.com/what-is-omnipod/omnipod-5

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What now?

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Next steps

1. You don't have to decide today to use CGM or a pump. Do some research and think about what is best for you or your child or your family
2. Have a conversation about technology with your provider at future visit
3. We will write the prescription

Master basic skills: if technology fails, blood sugar checks and insulin injections are needed

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Things to Know about Insurance Coverage

- Insurance companies vary different on their coverage of diabetes technology including CGM and insulin pumps. You may have coverage either through pharmacy or medical benefits, but it depends on your plan specifics.
- Insurance companies have many requirements that must be met before approving medical devices and equipment.
  This can include:
  - Checking BG 4 times a day for 30 days OR 80% or more sensor wear
  - Proof of clinic attendance and/or documentation of diabetes technology education
    (Us talking today is only part of this requirement)

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