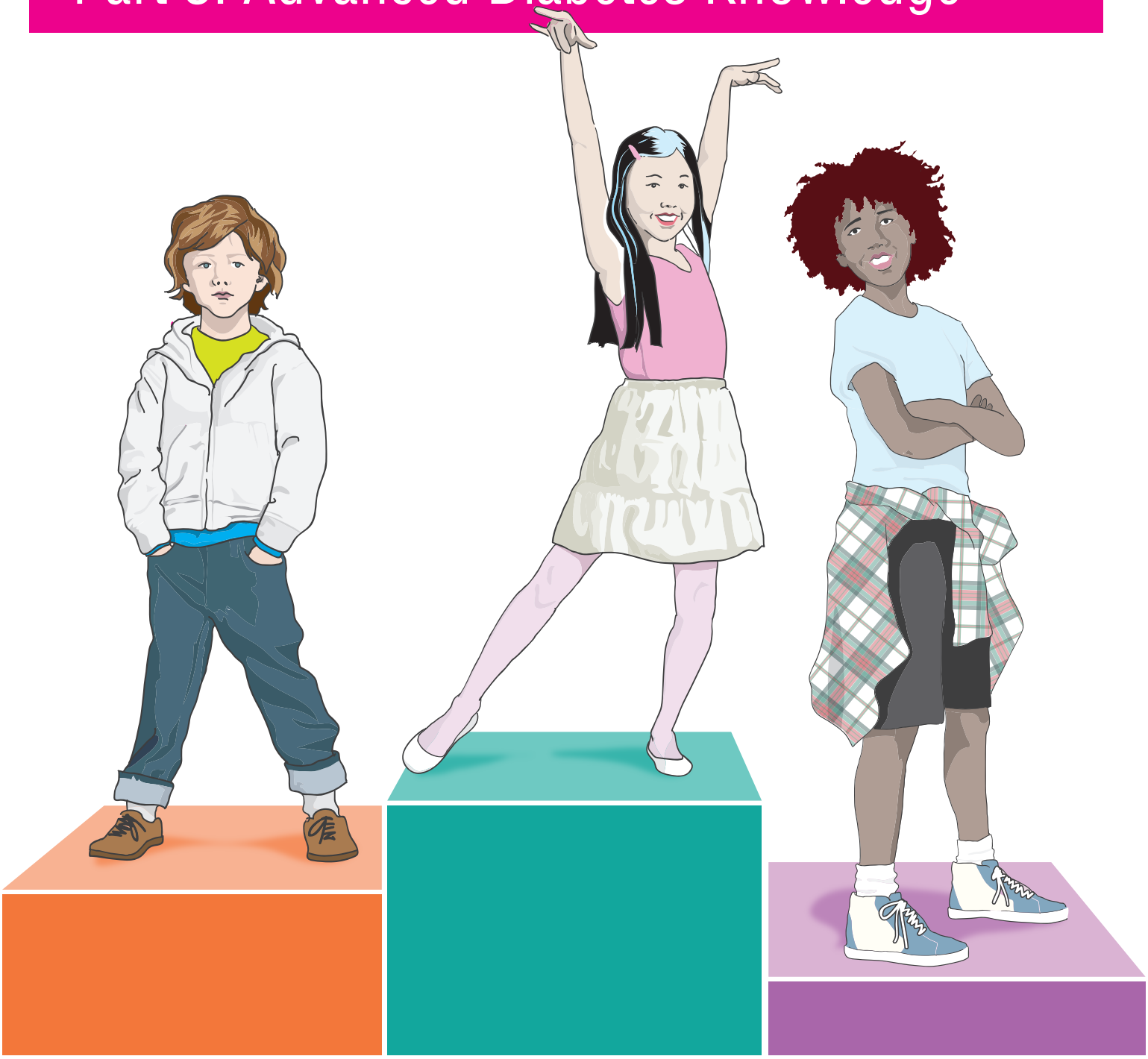
Pediatric Diabetes

Part 3: Advanced Diabetes Knowledge



This guidebook is to help you and your family understand diabetes and manage your child's care.

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Hôpital de Montréal pour enfants
Centre universitaire de santé McGill

Montreal Children's Hospital
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Acknowledgements

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IMPORTANT: PLEASE READ

Information provided by this booklet is for educational purposes. It is not intended to replace the advice or instruction of a professional healthcare practitioner, or to substitute for medical care. Contact a qualified healthcare practitioner if you have any questions concerning your care.

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This material is also available at:
MUHC Patient Education Portal
muhcpatienteducation.ca

A message from your diabetes team

We created Part 3 of the diabetes guidebook to help you manage your child's diabetes more independently. This takes time and practice.

This guidebook has examples of real-life situations. These examples will explain why blood sugars change so that you understand how to manage your child's blood sugar.

Diabetes management can be tricky. But your child can learn how to continue to do all the things kids normally do with support from your whole family.

Remember, you are not on your own! If you cannot find an answer to a question or do not know what to do, contact a member of the diabetes team.

We are here to help.

The Pediatric Diabetes Team

Table of contents

About your blood sugar

2 What can affect your blood sugar?
3 How can insulin affect your blood sugar?
5 How can food affect your blood sugar?
6 How can exercise affect your blood sugar?
8 How to prevent hypoglycemia during activity/exercise (examples)
13 How can stress and illness affect your blood sugar?
14 What to do if you are sick and not vomiting
What to do if you are sick and vomiting
15 When to call the doctor

16 Getting to know your insulin

18 How to adjust your insulin
Part 1: How to look at your logbook?
20 Part 2: How to manage the blood sugar at bedtime
Examples of snacks depending on your age
22 Practice
23 How to adjust your bedtime insulin if you see a trend?
24 Common reasons for hyperglycemia and hypoglycemia and what you can do
29 Follow-up clinic visit: What to expect
31 More information about the HbA1C test

Appendix

35 42 Factors that affect blood glucose
36 Insulin and adjustment for carbohydrate snacks
39 Ketone managment
43 Mini-dose of Glucagon/Glucagen protocol
46 Travel tips and letter
49 Notes

About your blood sugar

What can affect your blood sugar?

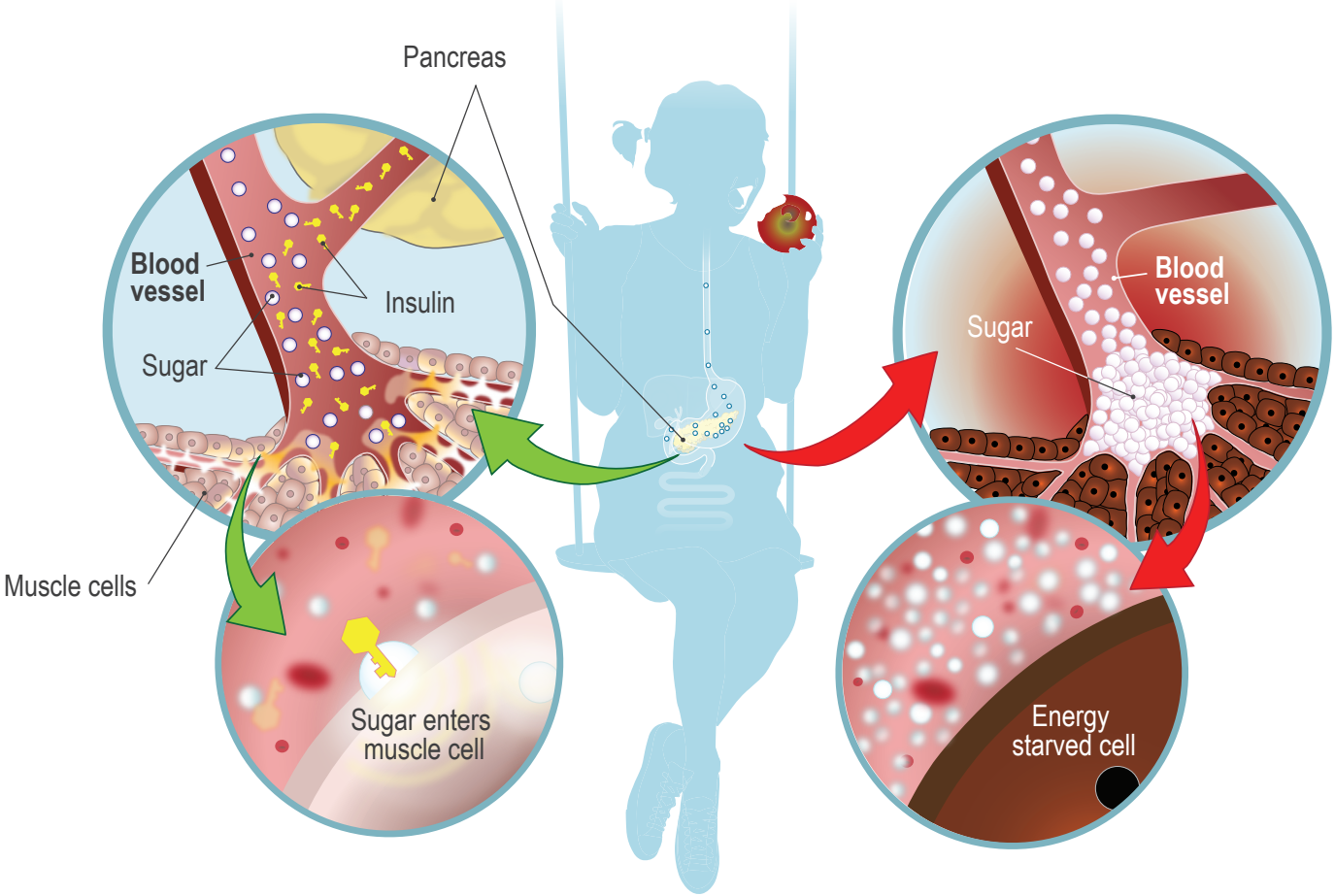
There are many things that can affect your blood sugar (See Appendix 1 for a list of 42 things). The most common ones are:

- insulin
- food
- exercise and actvity
- stress and illness

How does INSULIN affect your blood sugar?

Insulin helps move sugar from the blood vessels into cells to create energy. Without insulin,

- sugar builds up in the blood
- sugar cannot enter the cells to create energy
- sugar stays in the blood, so your blood sugar increases.



Your **insulin** injections replace the insulin your body does not make.

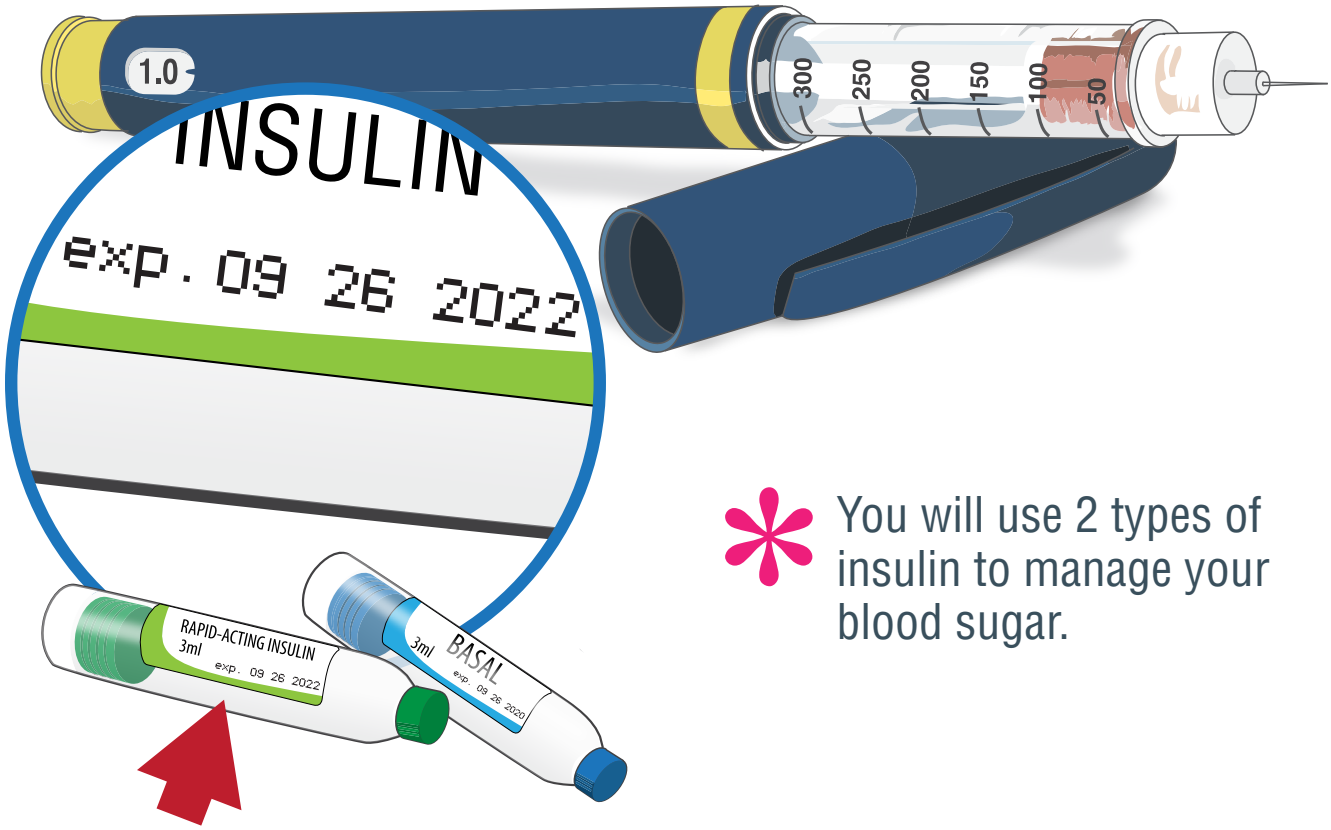
There are 2 main types of insulin: Rapid and Basal.

- **Rapid-acting insulin** works quickly and lasts a short time.

  It starts to lower blood sugar **5 - 15 minutes** after the injection. It lasts about **4 hours.** This is the insulin that covers meals and snacks.

- **Basal-acting insulin** takes a long time to work but lasts a long time.

  It starts to stabilize the blood sugar about **60 - 90 minutes** after the injection. It lasts about **24 hours.** Use this insulin once a day, at the same time every day.



You will use 2 types of insulin to manage your blood sugar.

We know that it takes some time to get used to the diabetes routine. We recommend that you follow your daily routine described in guidebook #1.

When the amount of carbohydrates you eat is variable (changes), your blood sugar will be variable too. This is when learning about carbohydrate counting and ratios will become important.

Make sure to speak with the diabetes team if if you want to learn more about this. You can also visit the nutrition tab on the Montreal Children's Diabetes website.

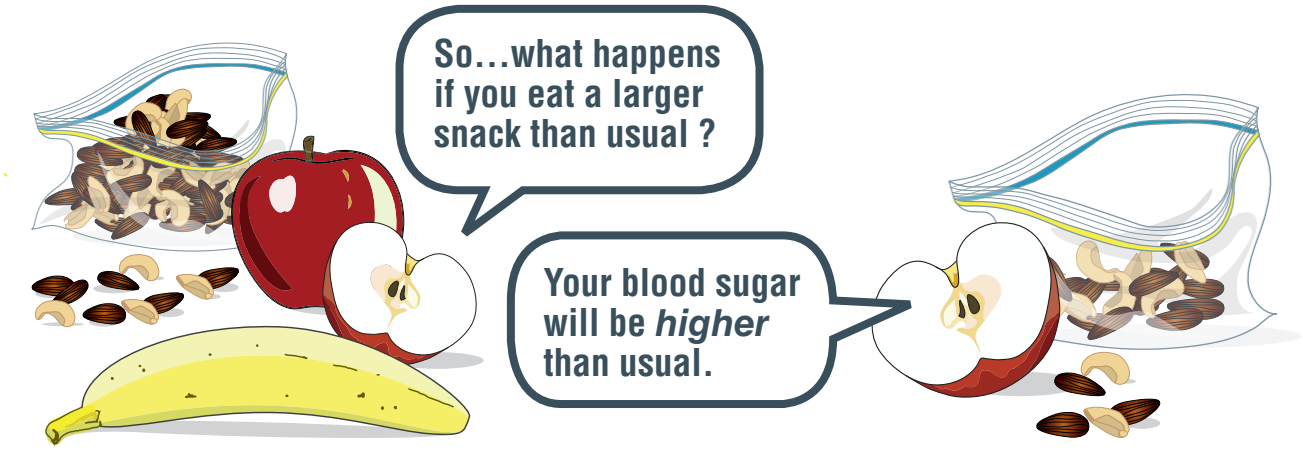
http://www.thechildren.com/departments-and-staff/departments/department-of-diabetes

By writing down and reviewing your blood sugar patterns, you will learn what affects your blood sugar and how.

How does FOOD affect your blood sugar?

Food has 3 main nutrients: protein, fats, and carbohydrates. Out of these nutrients, foods with carbohydrates affect your blood sugar the most.

Carbohydrates in food and drink make your **blood sugar go up.**
The **amount of carbohydrates** affects **how much** your blood sugar goes up.



What should you do?

Try to eat a snack that has the same amount of carbohydrates every day. Counting carbohydrates will help keep your blood sugar stable. Over time, you will learn how to adjust the amount of insulin according to the amount of carbohydrates you will eat. This is called ratios.

How does activity or EXERCISE affect your blood sugar?

Exercise and being physically active will help you stay healthy.

Because your muscles need sugar for energy, your blood sugar can go down during or after exercise. It is also possible that your blood sugar might go up. This is more likely to happen during or after a stressful or competitive activity. Everyone is different.

Your exercise and activity will affect you differently depending on:

- **Type of activity**
- **Intensity**
- **Time of day**
- **Length of time**
- **Type of Insulin and timing of injection**

Decrease blood sugar a lot

high intensity (e.g. running)

long activity (e.g. a full day at water park)

0-3 hours after injection of rapid-acting insulin

Decrease blood sugar moderately

moderate intensity (e.g. jogging)

short activity (e.g. 1 hour)

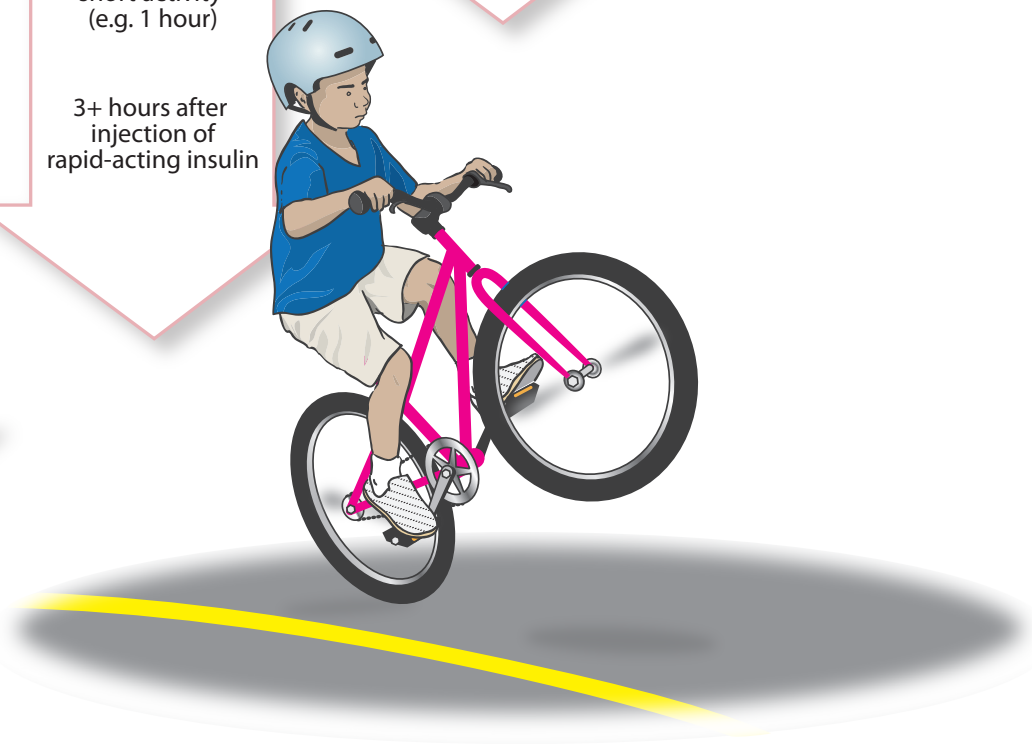
3+ hours after injection of rapid-acting insulin

Decrease blood Sugar a little

low intensity (e.g. walking)

strengthening (e.g. weightlifting, hockey)

Increase blood sugar

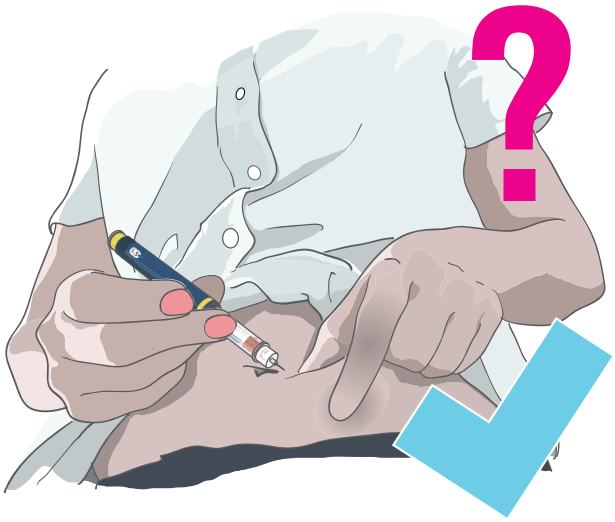


Insulin injection site: Insulin is absorbed quickly if injected in the same muscles being used during the activity.

Faster insulin absorption = lower blood sugar = risk of hypoglycemia

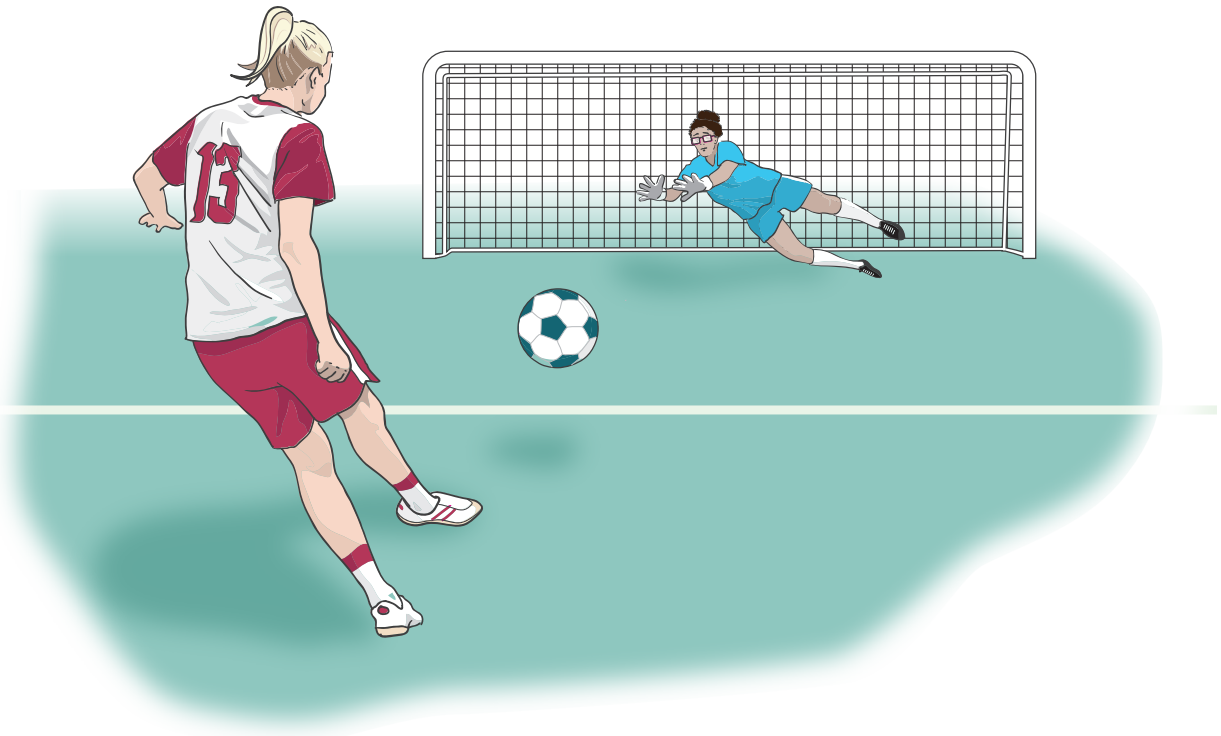
Tip: avoid giving the insulin in an area where the muscle will be used soon after the injection.

Example: Don't inject insulin in the thigh before playing soccer.



Your goal is to keep your blood sugar between 8-10 mmol/L while exercising or being physically active . Check your blood sugar regularly – before, during and after exercise to see how it affects you.

Write down what you tried. This will help you remember what worked.



How can you prevent **hypoglycemia** (low blood sugar) during an activity or exercise?

Check your blood sugar before an activity and every hour during the activity

If the blood sugar is under 4 mmol/L, first treat the hypoglycemia (follow the hypoglycemia protocol) then eat a snack that contains carbohydrates. You can take 5, 10, or 15 grams (depending on age) of carbohydrates for every 30 minutes of intense activity.

If the blood sugar is between 4 and 8 mmol/L, eat a snack that contains carbohydrates. You can take 5, 10, or 15 grams (depending on age) of carbohydrates for every 30 minutes of intense activity.

If the blood sugar is above 8 mmol/L, you can do the activity or exercise without eating a snack. Do not forget to check the blood sugar every hour or take a snack that contains carbohydrates. You can take 5, 10, or 15 grams (depending on age) of carbohydrates after 1 hour of activity.

If you do an activity or exercise without checking your blood sugar take 5, 10, or 15 grams of carbohydrates (depending on age) for every 30 minutes of intense activity. You can use any kind of carbohydrates.

Before gym class, Jordan does not check his blood sugar so he eats a clementine or drinks soy milk to prevent hypoglycemia.

Here are some examples of how to prevent hypoglycemia.

Marc, who is 14 years old, walked home with his friend and decided to play a game of basketball.

He ***was not planning*** this activity.

What should he do?

- Check the blood sugar before, during and after the activity.
- If the blood sugar is under 8 mmol/L eat a snack that has carbohydrates. If the blood sugar is 8 mmol/L and above, he can safely start his activity

If Marc forgets to check his blood sugar, he needs to eat a snack that has 15 grams of carbohydrates before starting the activity

Remember, **you can** participate in activities even if they are not planned. Just follow the tips above to keep your blood sugar stable.

If you are planning an activity

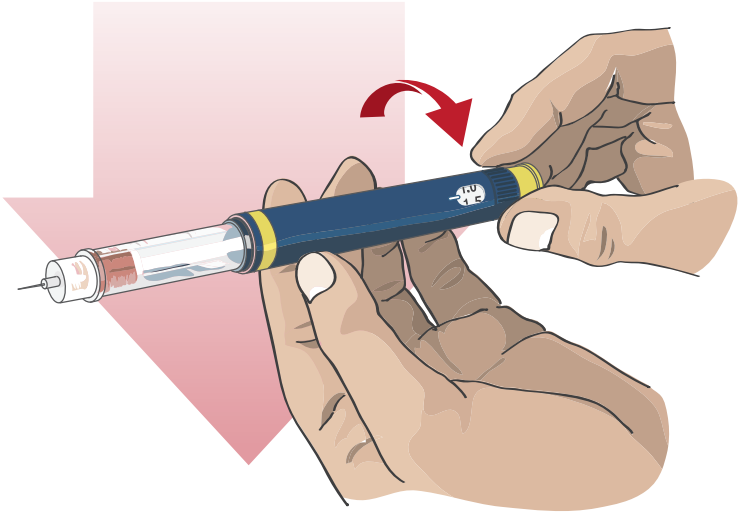
If you are planning an exercise or activity, you can **lower your insulin dose** that you take **before the activity.**

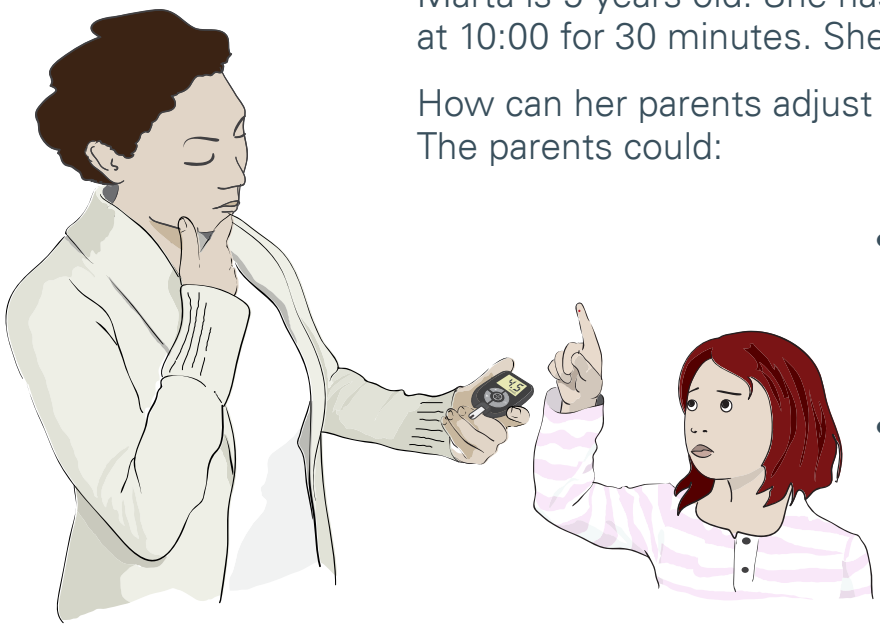
Example 1

Nancy is 10 years old and has a soccer practice every Monday and Wednesday at 19:00 for 1 hour. She usually has dinner around 17h30.

How can she adjust the insulin for that activity? Nancy could:

- lower the rapid-acting insulin dose by 2 units before dinner (depending on the regular dose)
- ***And*** check her blood sugar before, during and after her practice. This will help to guide future insulin adjustments.





Example 2

Marta is 5 years old. She has a swim class every Saturday at 10:00 for 30 minutes. She eats breakfast at 7:00.

How can her parents adjust her insulin for that activity? The parents could:

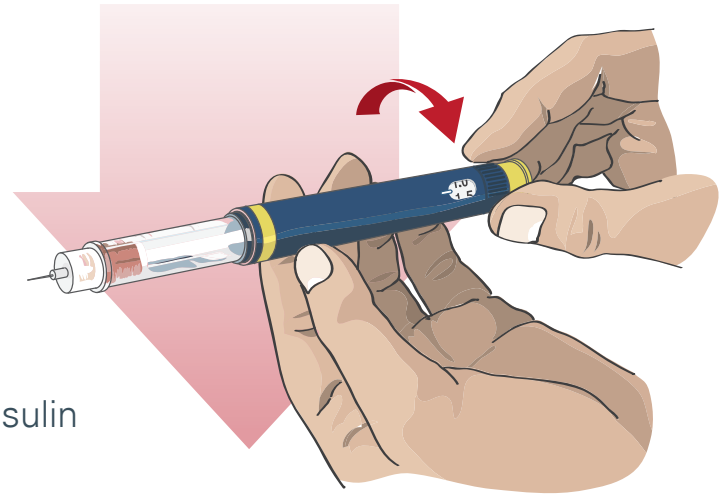
- lower her rapid-acting insulin dose before breakfast by 0.5 or 1 unit (depending on the regular dose)
- check her blood sugar before and after her class. This will help to guide future insulin adjustments.

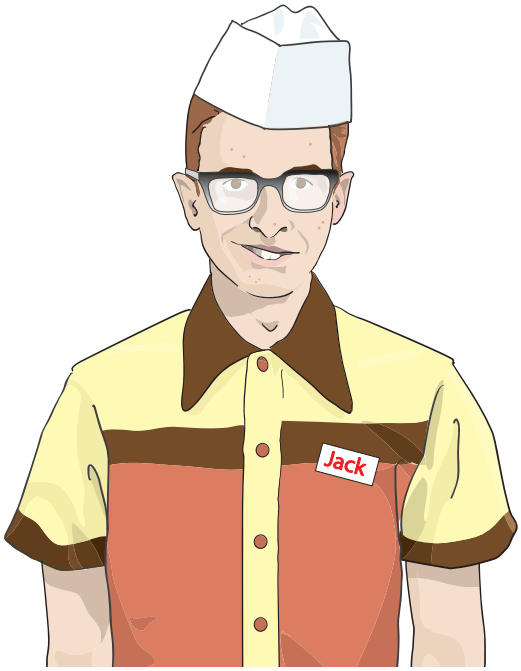
Example 3

Jade is 12 years old and is going on a day trip with her school to a museum in Ottawa. She normally takes rapid-acting insulin before each meal. The bus leaves at 8:00 and returns at 17:00.

How can the parents help her adjust her insulin doses for the day?

- **They could** lower her rapid-acting insulin dose before each meal by 1-2 units (depending on the regular dose)





Example 4

Jack is 16 years old and is starting a summer job in a fast food restaurant. He will be working as a cashier from 16:00 to 22:00. He has a 30 minute break for dinner at 20:00. He takes rapid-acting insulin before every meal. He eats lunch at 14:00.

Does he need to adjust his insulin?

YES! His job is an activity. Activities can affect your blood sugar just like exercise.

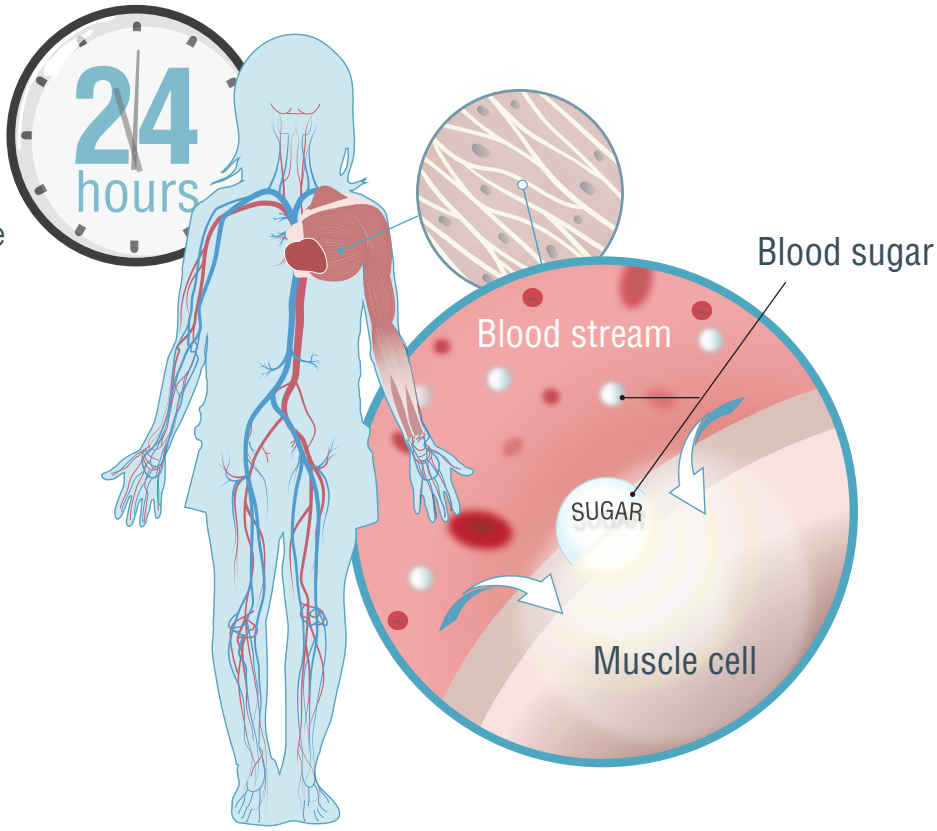
- lower the rapid-acting insulin dose before lunch by 25 %
- ***And*** lower the rapid-acting insulin dose before dinner by 50 %

Jack should check his blood sugar before starting, midway, and at the end his shift. If Jack forgets to lower his lunch-time insulin dose or is too busy, he should eat a snack that has carbohydrates before starting his shift.

How long does exercise affect your blood sugar?

DID YOU KNOW?

- Exercise can affect your blood sugar for **up to 24 hours.**
- Your muscles will continue to use the sugar that is in the blood for a long time after exercising.
- Your muscles need to be replenished with sugar to be ready for the next activity. This is why hypoglycemia can happen up to 24 hours after an activity.

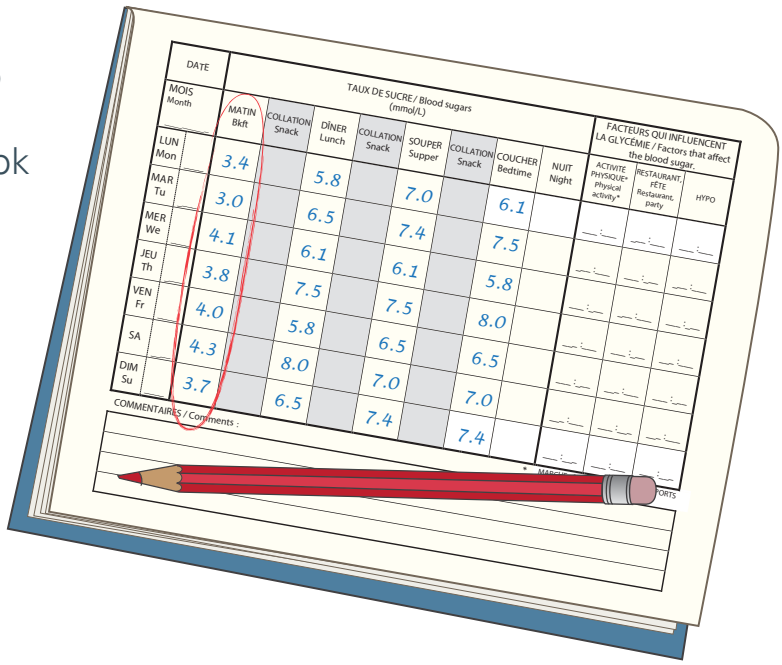


Example

Kai is a competitive soccer player who practices almost 7 evenings a week. After reviewing the blood sugar logbook for a week, he notices that he has hypoglycemia every morning.

How did he adjust his insulin after he noticed his hypoglycemia?

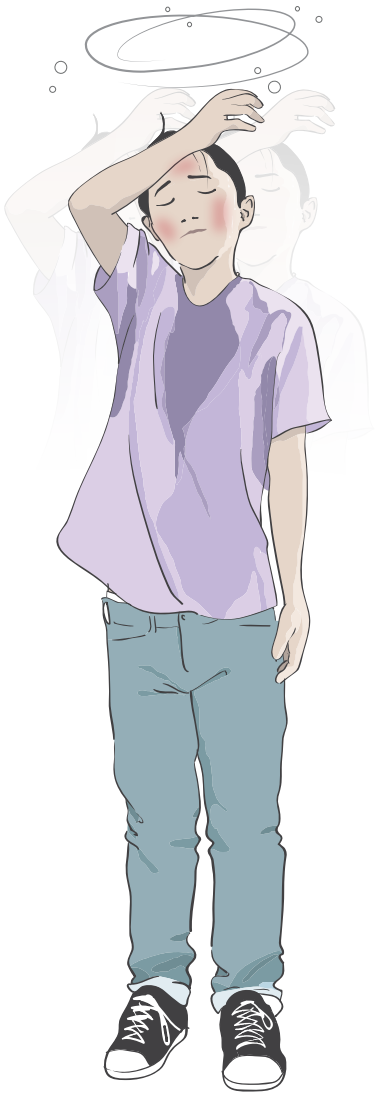
- He decreased his basal-acting insulin at bedtime.



Be prepared. Always bring your diabetes kit with you when you leave your house.

- Blood glucose meter
- Test strips
- Lancet device
- Hand sanitizer and alcohol swabs
- Fast carbohydrates (ex: juice, dextrose tablets)
- Snacks that have carbohydrates (ex: granola bar)
- Insulin

How does STRESS or SICKNESS affect your blood sugar?



Stress can be positive or negative. Being excited, sad, or angry are examples of **emotional stress.** Being sick with fever or nausea are examples of **physical stress**.

Stress usually makes your blood sugar go higher. But it can also make your blood sugar go lower.

Your body reacts to stress by increasing adrenaline and cortisol (the "stress hormones") which can increase blood sugar. Glucagon is also released, which causes the liver to release sugar into the blood. This increases your blood sugar even more.

Exercise, stress, and illness affect everyone in different ways. In time, you will get to know how your body reacts and how your blood sugar changes. Occasionally, your body will not react the way you expect.

What can you do if you are sick and *not* vomiting?

S – Check blood **Sugar** every 2-3 hours or as necessary
I – Take your **Insulin.** Not taking insulin could lead to ketones.
C – Drink fluids and eat food that have **Carbohydrates** as tolerated
K – Check **Ketones** in blood or urine every 4 hours (ie. 12PM, 4PM, 8PM, etc.)

If you have ketones: Look at the table on page 40 for help with deciding the extra rapid-acting insulin dose needed to remove the ketones and/or call the on-call emergency number.

It is safe to use Tylenol, Advil, antibiotics, or other medications with insulin. For example, if you have a fever, you may take Tylenol or Advil as needed.

What should you do if you are sick and vomiting?

Vomiting can be caused by a gastrointestinal bug, but it can also be a sign of diabetic ketoacidosis (DKA).

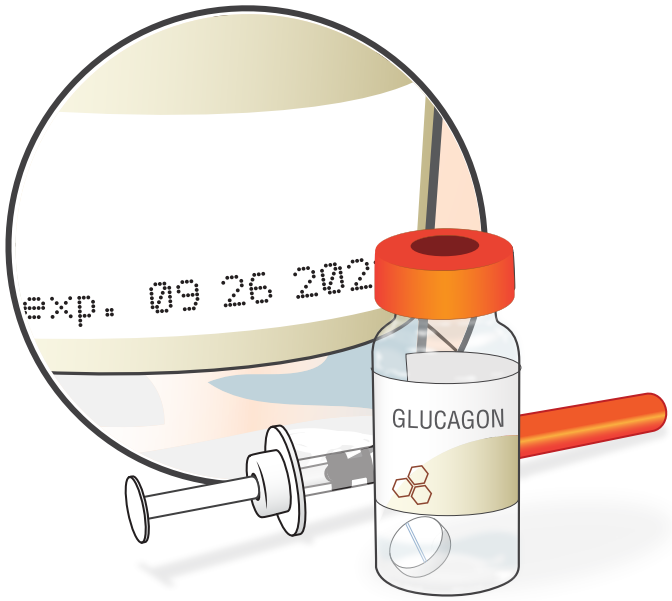
Red Flag: High ketones can be caused by not taking your daily insulin injections.

S – Check blood **Sugar** every 2-3 hours or as necessary
I – Take your **Insulin.** Not taking insulin could lead to ketones.
C – Drink fluids and eat food that have **Carbohydrates** as tolerated
K – Check **Ketones** in blood or urine every 4 hours (ie. 12PM, 4PM, 8PM, etc.)

If you have ketones: Look at the table on page 40 for help with deciding the extra rapid-acting insulin dose needed to remove the ketones and/or call the on-call the emergency number.

For nausea: You can use Zofran or Gravol (follow the dosing instructions on the package).

Red Flag: If your child vomits soon after their regular insulin injection, your child is at risk of having hypoglycemia. This happens when there is too much insulin in the body and not enough carbohydrates.



Be prepared: keep non-expired glucagon and insulin syringes at home.

If you have tried 3 hypoglycemia treatments in 1 hour and the blood sugar is still less than 4 mmol/L, you may give a mini-dose of Glucagon: Follow the instructions in the appendix on page 43 and/or call the on-call emergency number.

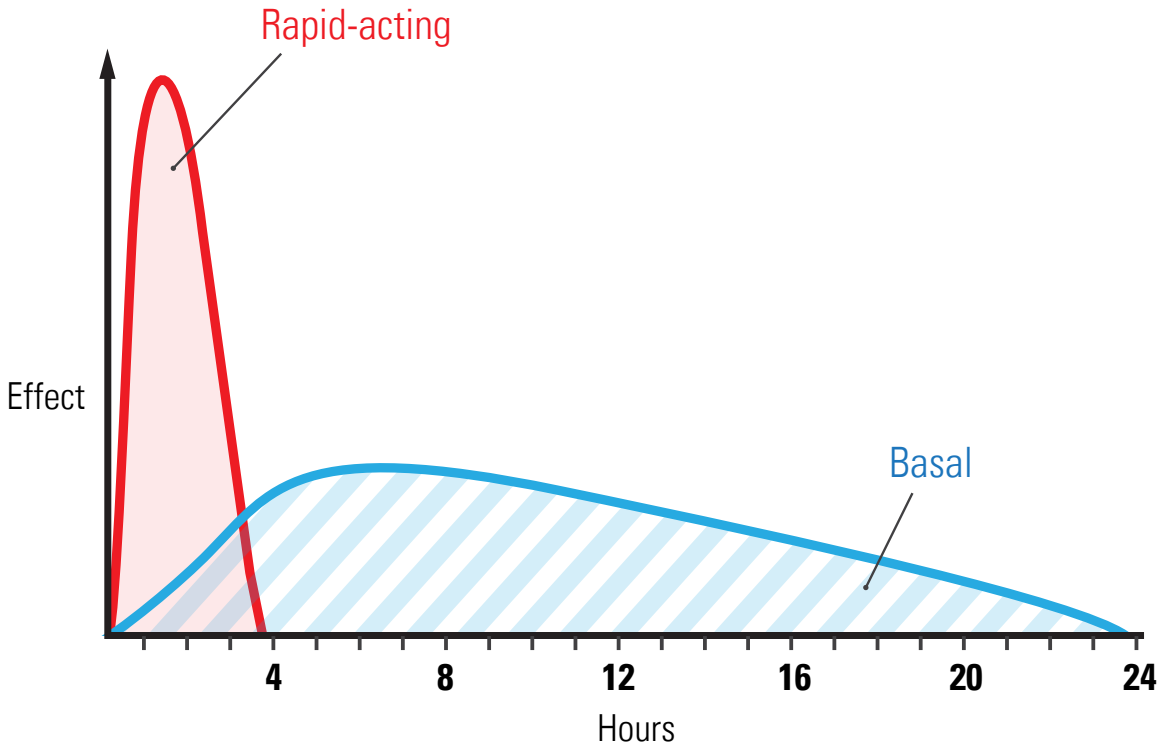
When should you contact the doctor on call when your child is sick?

- Do not know how much insulin to give
- Your child is under 5 years old
- Unable to keep the blood sugar above 4 mmol/L
- Cannot drink or eat anything because of vomiting, nausea or not being hungry
- Ketones are still in the blood or urine after 1 or 2 extra doses of insulin
- Ketones are present but the blood sugar is below 8.0 mmol/L
- Signs of high level of ketones: weakness, fatigue, stomach pain and rapid breathing
- Any time you are worried about your child's diabetes!

Getting to know your insulin

Now that you know what affects your blood sugar, you can start to learn to adjust your insulin.

What type of insulin are you taking?



Rapid-Acting Insulin

Starts in: 5 - 15 minutes

Lasts: 4 hours
(Peaks for: 1.5 - 2 hours)

Basal Insulin

Starts in: 60 - 90 minutes

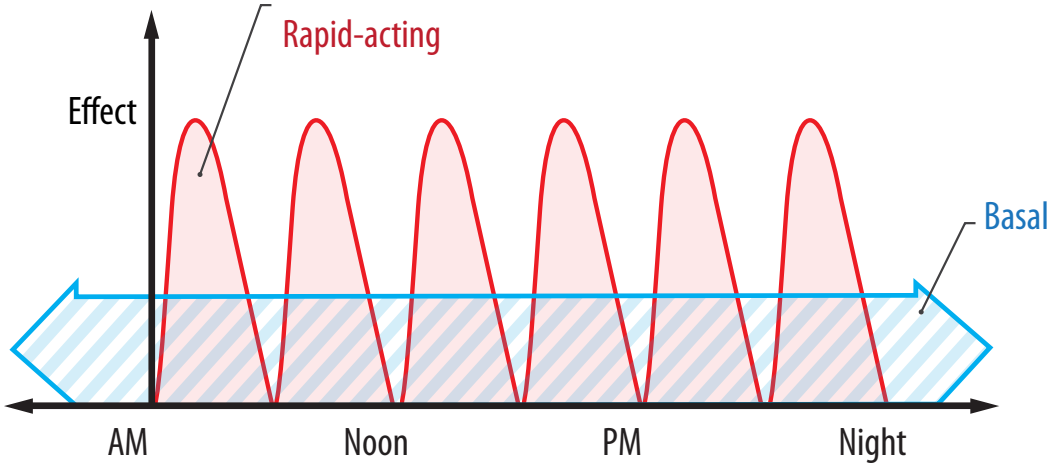
Lasts: 24 hours
(Important to take at the same time every day.)

There are 2 ways to give insulin when children are first diagnosed with diabetes. This was chosen by your diabetes team to best fit your child's daily routine.

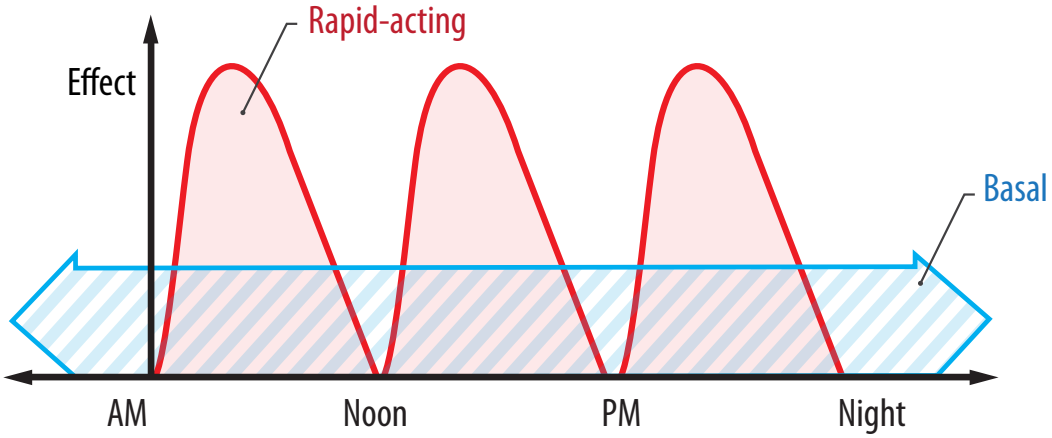
Which picture below describes your child's schedule of which insulin is given at what time? **See appendix for adjusting guidelines.**

Insulin Schedule

A **Eats carbohydrates at snacktime**



B **Does not eat carbohydrates at snacktime.**

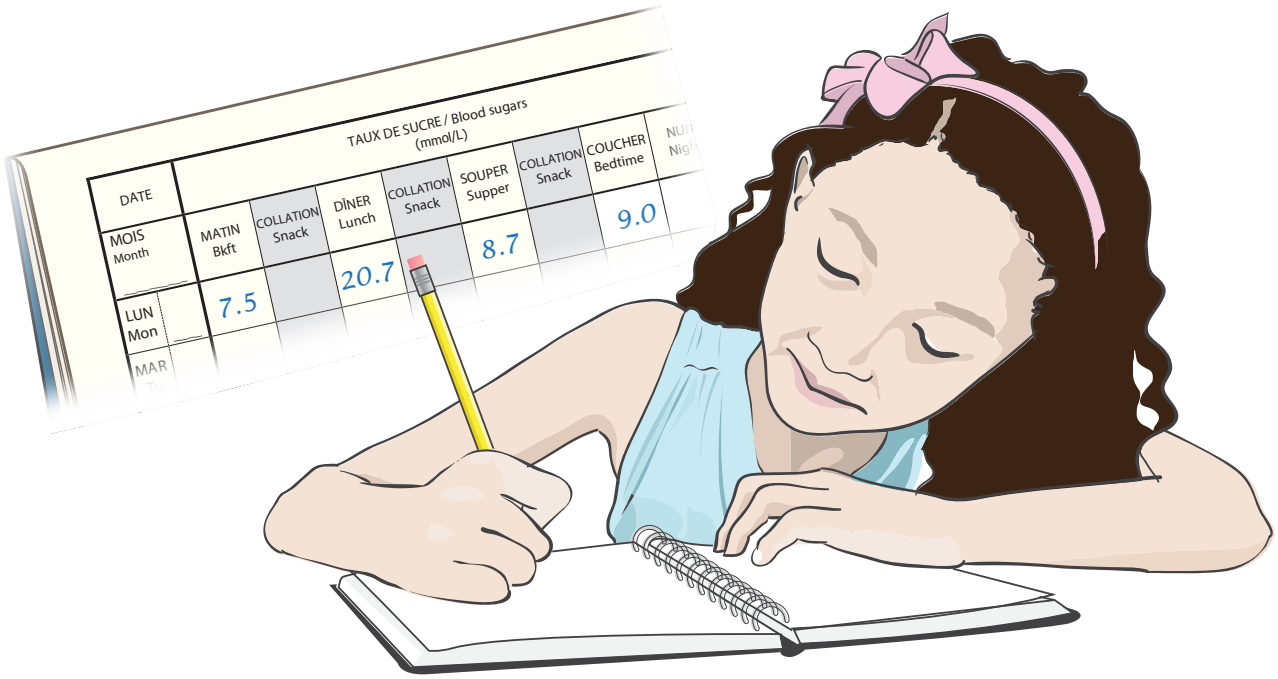


How to adjust your insulin?

Use your logbook to keep track of your blood sugars. Enter comments that will help explain the blood sugar readings (soccer practice, party, skipped snack, sick, special activity at school, etc.).

Part 1: How to look at your logbook? (breakfast, lunch, supper)

Here is Leila's logbook entry for one day
Question: Do you notice anything?



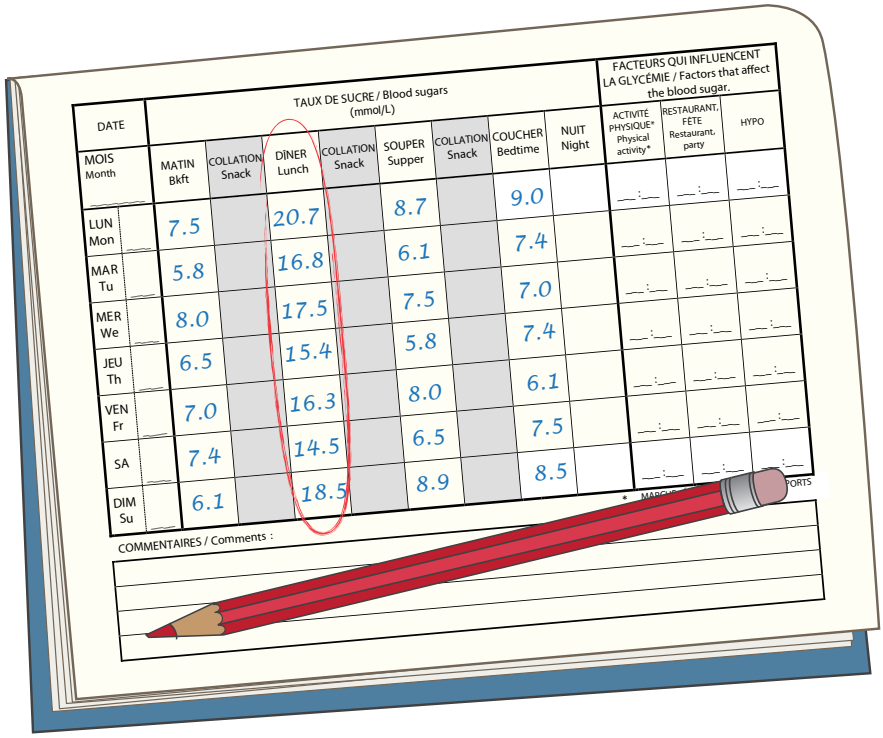
1. Check the logbook. Do not change anything after only one day of blood sugars.
2. Wait at least 3 to 7 days to see if there is a trend. (A trend is a general direction of blood sugars above target range or below target range.)
3. Evaluate each period of the day separately. For example, look at the AM blood sugars, the lunch time blood sugars, then the PM blood sugars.
4. Questions to ask while looking at each period of the day
   Are your blood sugars in target range (4-8 mmol/L) before each meal?
5. If the blood sugars are in target range, do not change the insulin dose.

If you notice a hypoglycemia blood sugar trend, lower the insulin dose.

✻ **TIP:** Manage the hypoglycemia trends first
**no more than 2 hypoglycemias per week

If you notice a hyperglycemia blood sugar trend, increase the insulin dose.

✻ **TIP:** Manage the hyperglycemia trends after you resolve the hypoglycemia trends. Make one insulin adjustment every 3 to 7 days as needed.



DATE / MOIS Month	TAUX DE SUCRE / Blood sugars (mmol/L)								FACTEURS QUI INFLUENCENT LA GLYCÉMIE / Factors that affect the blood sugar.		
	MATIN Bkft	COLLATION Snack	DÎNER Lunch	COLLATION Snack	SOUPER Supper	COLLATION Snack	COUCHER Bedtime	NUIT Night	ACTIVITÉ PHYSIQUE* Physical activity*	RESTAURANT, FÊTE Restaurant, party	HYPO
LUN Mon	7.5		20.7		8.7		9.0				
MAR Tu	5.8		16.8		6.1		7.4				
MER We	8.0		17.5		7.5		7.0				
JEU Th	6.5		15.4		5.8		7.4				
VEN Fr	7.0		16.3		8.0		6.1				
SA	7.4		14.5		6.5		7.5				
DIM Su	6.1		18.5		8.9		8.5				

COMMENTAIRES / Comments :

Leila's logbook for the last 7 days

Leila's logbook shows a high blood sugar just before lunch. All other readings are in target range. After 7 days, we see a trend of hyperglycemia.

6. What is the insulin schedule? (Refer to page 17)
7. What are the insulin doses?
8. Which insulin do you need to adjust? Ask yourself when was the last time you injected insulin? This is the insulin that you have to adjust.
9. How much should you adjust?

- Change the insulin by 0.5 unit (if the dose is between 0 to 10 units)
- Change the insulin by 1 unit (if the dose is 10 units or more)

Part 2: How to manage the blood sugar at bedtime

Look at blood sugars in the logbook again, but just the bedtime ones. As you review the blood sugars, ask yourself these questions.

1. How long ago did you eat dinner?

Less than 2 hours ago
More than 2 hours ago

2. Is your blood sugar at bedtime in the target range?

Less than 2 hours after dinner between 8-10 mmol/L

More than 2 hours after dinner between 6-9 mmol/L

3. Do you need to eat a bedtime snack?

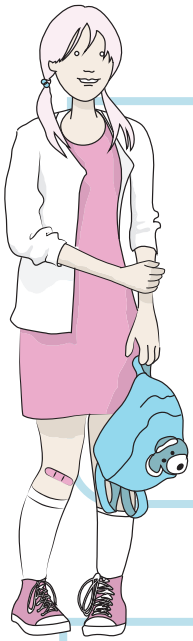
Yes, if the blood sugar is **below** the target range, **eat a bedtime snack with carbohydrates** and protein, depending on your age without a rapid-acting insulin injection.

Here are examples of snacks depending on your age:

0 to 4 years old

5 g carbohydrates snack with protein **=**

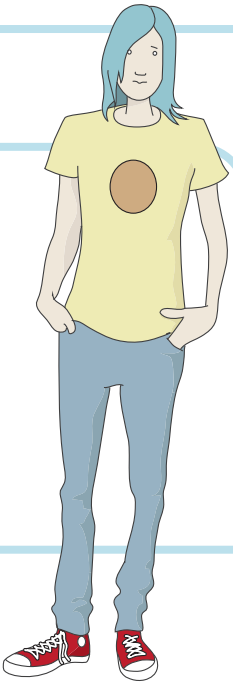
- 1/2 cup of milk or
- 1/2 toast + nut butter or
- 1/2 a fruit (e.g., apple, pear, peach) + cheese



5 to 10 years old

10 g carbohydrates snack with protein **=**

- 1 cup of milk or
- 1/2 toast + nut butter or
- 1/2 a fruit (e.g., apple, pear, peach) + cheese



11 years old or older

15 g carbohydrates with protein **=**

- 1 cup of milk or
- 1 toast + nut butter or
- 1 fruit (e.g., apple, pear, peach) + cheese

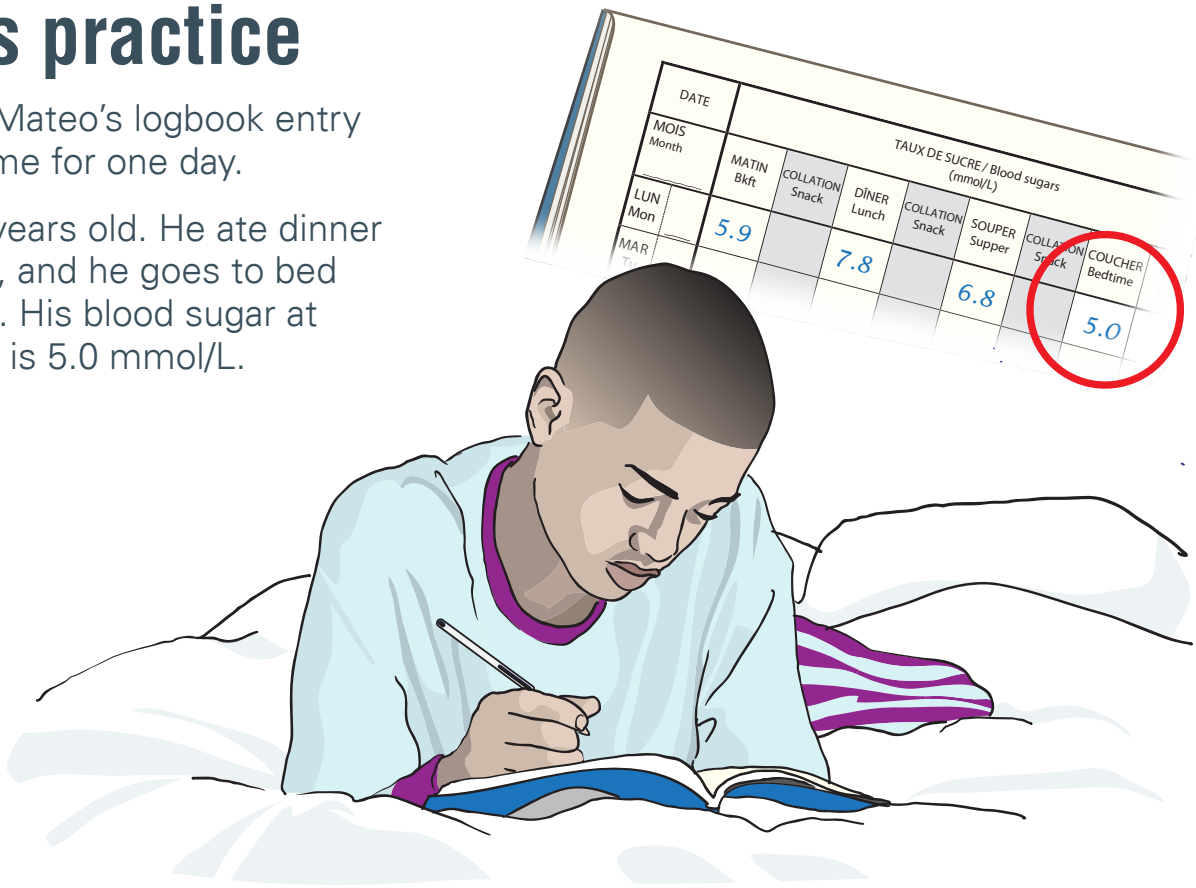
If the blood sugar is within target range at bedtime and your child is hungry, your child can eat these no-carbohydrate snacks without taking rapid-acting insulin.

- Vegetables (by itself or with dip)
- Nuts and seeds or nut butter
- Cold cuts / cooked chicken
- Smoked salmon and shrimp
- Tomato or vegetable juice
- Tuna
- Edamame
- Eggs
- Cheese
- Almond, soy, rice drinks (unsweetened)
- Olives
- Avocado

Let's practice

Here is Mateo's logbook entry at bedtime for one day.

He is 8 years old. He ate dinner at 18:00, and he goes to bed at 21:00. His blood sugar at bedtime is 5.0 mmol/L.



What questions should he ask himself at bedtime?

1. How long ago did he eat dinner? 3 hours ago.

2. Is his bedtime blood sugar in the target range?

The target range is 6 to 9 mmol/L. His blood sugar is below the target range at 5 mmol/L.

3. Does he need to eat a bedtime snack?

Yes, he needs to eat a 10 g carbohydrate snack + protein according to his age with no rapid-acting insulin injection.

Question: **Can he have a bedtime snack if his blood sugar at bedtime was in the target range (between 6 to 9 mmol)?**

Answer: He could have:

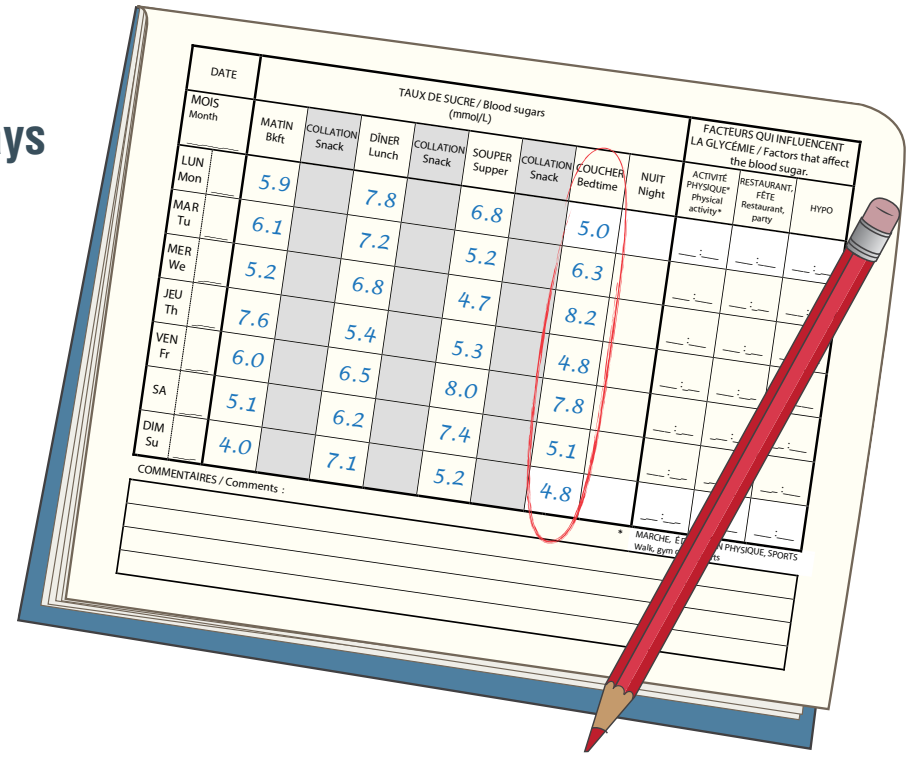
a snack without carbohydrates

or

a snack with carbohydrates + a rapid-acting insulin injection.

Now, here is Mateo's logbook for the past 7 days

After 7 days, we see a trend of hypoglycemia in the bedtime logbook.



Although a snack is a good option for a single (one-time) event, you should adjust your insulin if you see a trend (as in the example above).

How to adjust your bedtime insulin if you see a trend?

1. Check the logbook.
2. Confirm that there is a trend (out of range blood sugars for most of the week, not just one time).
3. If there is a trend, look at Mateo's insulin schedule (refer to page 17).

What are Mateo's insulin doses?
The insulin doses at supper are 2.5 / 3 / 3.5 / 4 / 4.5 units.

When was the last time he injected insulin?
The last time he injected insulin was at supper.

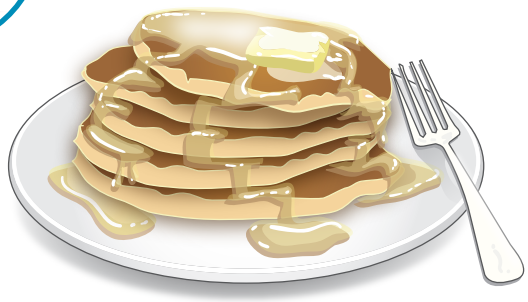
The insulin needs to be adjusted by how much?
Since his insulin doses are between 0-10 units, he will decrease the supper rapid-acting insulin dose by 0.5 units.

His new supper rapid-acting insulin scale will be: 2 / 2.5 / 3 / 3.5 / 4 units.

Common reasons for hyperglycemia and hypoglycemia and what you can do

1. Hyperglycemia at lunch

DATE	TAUX DE SUCRE / Blood sugars (mmol/L)								
MOIS Month	MATIN Bkft	COLLATION Snack	DÎNER Lunch	COLLATION Snack	SOUPER Supper	COLLATION Snack	COUCHER Bedtime	NUIT Night	AC PHYS Phy acti
LUN Mon	6.1		!		7.5		6.5		



Possible reason:
High carbohydrate breakfast

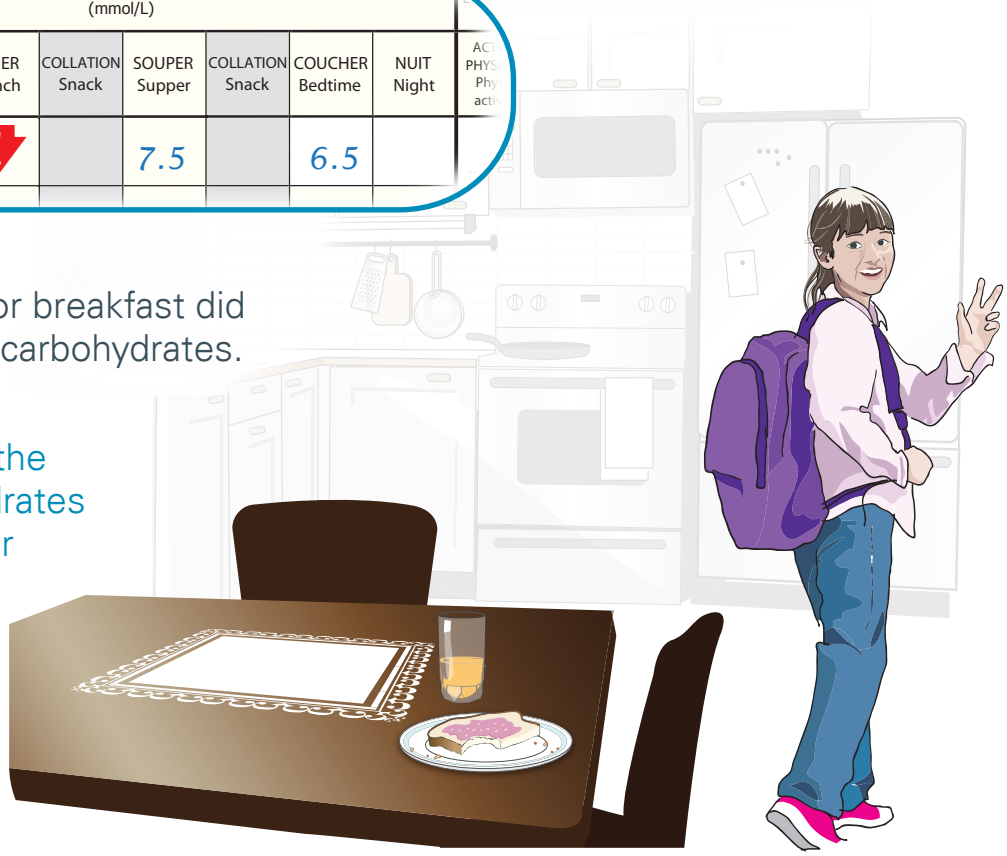
Possible action:
Be consistent with the amount of carbohydrates eaten at breakfast or increase breakfast insulin dose.

2. Hypoglycemia at lunch

DATE	TAUX DE SUCRE / Blood sugars (mmol/L)								
MOIS Month	MATIN Bkft	COLLATION Snack	DÎNER Lunch	COLLATION Snack	SOUPER Supper	COLLATION Snack	COUCHER Bedtime	NUIT Night	AC PHYS Phy acti
LUN Mon	6.1		!		7.5		6.5		

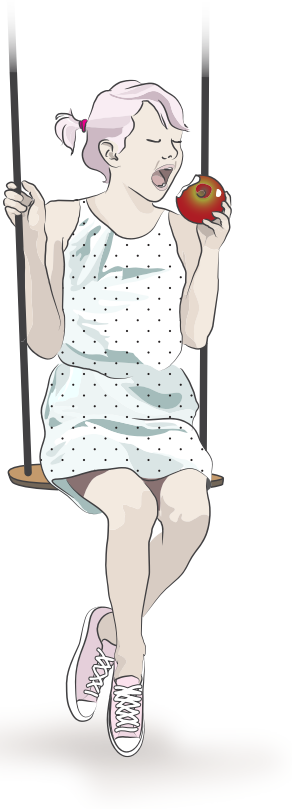
Possible reason:
Breakfast skipped, or breakfast did not include enough carbohydrates.

Possible action:
Be consistent with the amount of carbohydrates eaten at breakfast or reduce the insulin dose at breakfast.



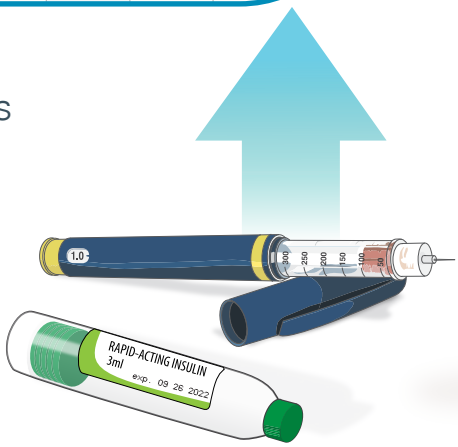
3. Hyperglycemia at Supper

DATE	TAUX DE SUCRE / Blood sugars (mmol/L)								
MOIS Month	MATIN Bkft	COLLATION Snack	DÎNER Lunch	COLLATION Snack	SOUPER Supper	COLLATION Snack	COUCHER Bedtime	NUIT Night	AC PHYS Phy acti
LUN Mon	6.1		5.8		!		6.5		



Possible reason:
Mid-afternoon snack that has carbohydrates.

Possible action:
Need to take rapid-acting insulin before the snack or eat a snack with no carbohydrates.

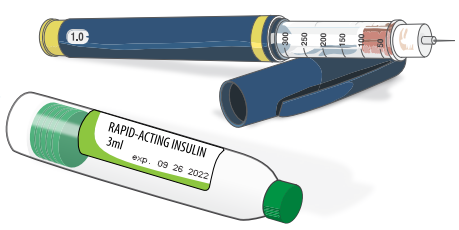


4. Hypoglycemia at Supper

DATE	TAUX DE SUCRE / Blood sugars (mmol/L)								
MOIS Month	MATIN Bkft	COLLATION Snack	DÎNER Lunch	COLLATION Snack	SOUPER Supper	COLLATION Snack	COUCHER Bedtime	NUIT Night	AC PHYS Phy acti
LUN Mon	6.1		5.8		!		6.5		

Possible reason:
More activity in the afternoon than usual.

Possible action:
Lower the lunch rapid-acting insulin dose or eat an extra snack that has carbohydrates.

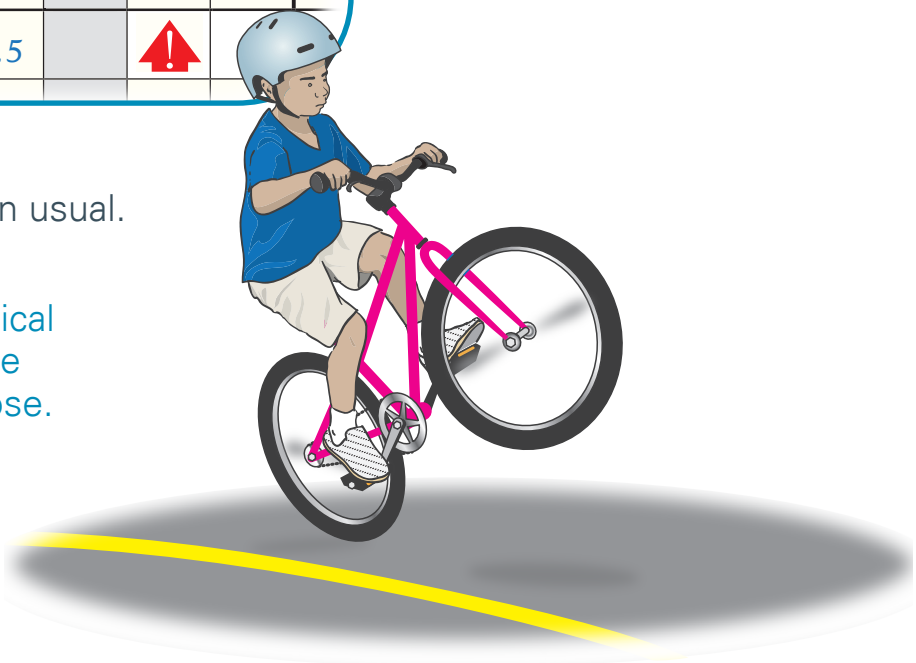


5. Hyperglycemia at bedtime

DATE	TAUX DE SUCRE / Blood sugars (mmol/L)								
MOIS Month	MATIN Bkft	COLLATION Snack	DÎNER Lunch	COLLATION Snack	SOUPER Supper	COLLATION Snack	COUCHER Bedtime	NUIT Night	ACT PHYS Phy acti
LUN Mon	6.1		5.8		7.5		⚠		

Possible reason:
Less activity after supper than usual.

Possible action:
Be consistent with your physical activity routine or increase the supper rapid-acting insulin dose.

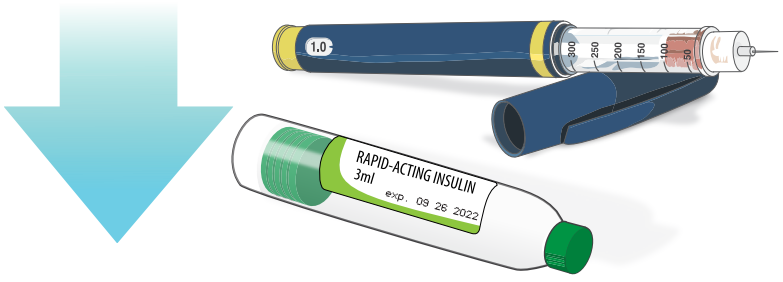


6. Hypoglycemia at bedtime

DATE	TAUX DE SUCRE / Blood sugars (mmol/L)								
MOIS Month	MATIN Bkft	COLLATION Snack	DÎNER Lunch	COLLATION Snack	SOUPER Supper	COLLATION Snack	COUCHER Bedtime	NUIT Night	ACT PHYS Phy acti
LUN Mon	6.1		5.8		7.5		⚠		

Possible reason:
Too much rapid-acting insulin at supper.

Possible action:
Lower supper rapid-acting insulin dose and make sure that insulin injections are supervised to avoid dose errors.

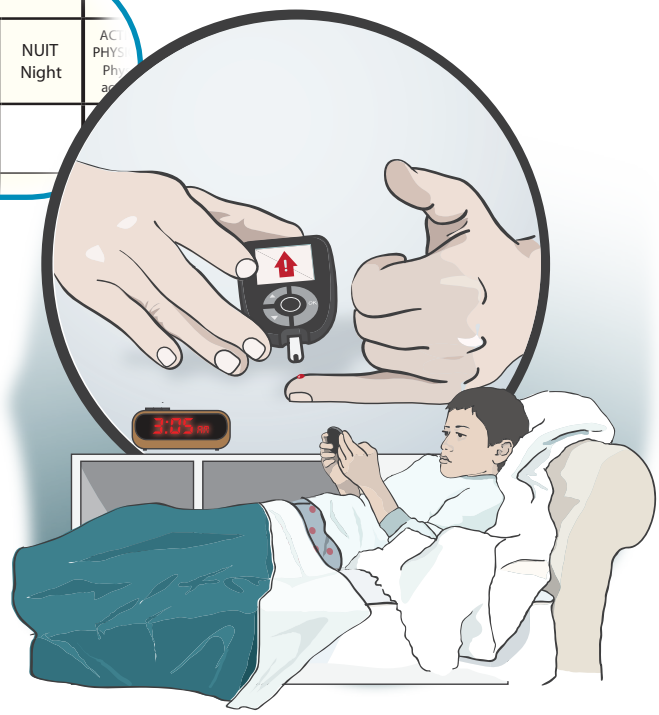


7. Hyperglycemia in AM

DATE	TAUX DE SUCRE / Blood sugars (mmol/L)								
MOIS Month	MATIN Bkft	COLLATION Snack	DÎNER Lunch	COLLATION Snack	SOUPER Supper	COLLATION Snack	COUCHER Bedtime	NUIT Night	ACT PHYS Phy act
LUN Mon	!		5.8		7.5		6.5		

Possible reason:
Not enough basal-acting insulin before bed.

Possible action:
Check the blood sugar at 3 AM. If the result is not low, increase basal-acting insulin dose.

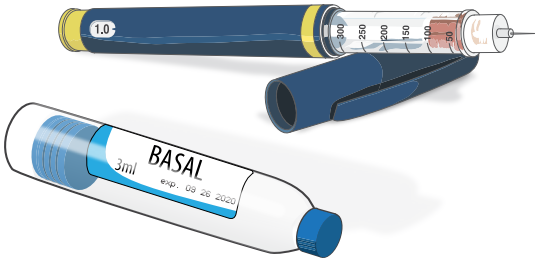


8. Hypoglycemia in AM

DATE	TAUX DE SUCRE / Blood sugars (mmol/L)								
MOIS Month	MATIN Bkft	COLLATION Snack	DÎNER Lunch	COLLATION Snack	SOUPER Supper	COLLATION Snack	COUCHER Bedtime	NUIT Night	ACT PHYS Phy act
LUN Mon	!		5.8		7.5		6.5		

Possible reason:
Too much basal-acting insulin at before bed.

Possible action:
Lower the basal-acting insulin dose.



Remember, if you have:

Hypoglycemia, decrease the insulin dose
Hyperglycemia, increase the insulin dose

When should you call the diabetes nurse for insulin adjustment advice?

- No improvement in blood sugar readings after 2-3 insulin adjustments
- Blood ketones are high, and you want to review the possible causes.
- Hypoglycemia happens more than twice a week, and you want to review the possible causes.
- You would like to discuss the insulin dose schedule

What information do you need to give to the diabetes nurse when you call for insulin adjustment advice?

- 1 week of blood sugar readings. Upload your continuous blood glucose monitoring device if you are using one.
- Insulin doses that you are using
- Any activities, special events or changes in your daily routine

Your clinic visit

What to expect at your diabetes clinic visit?

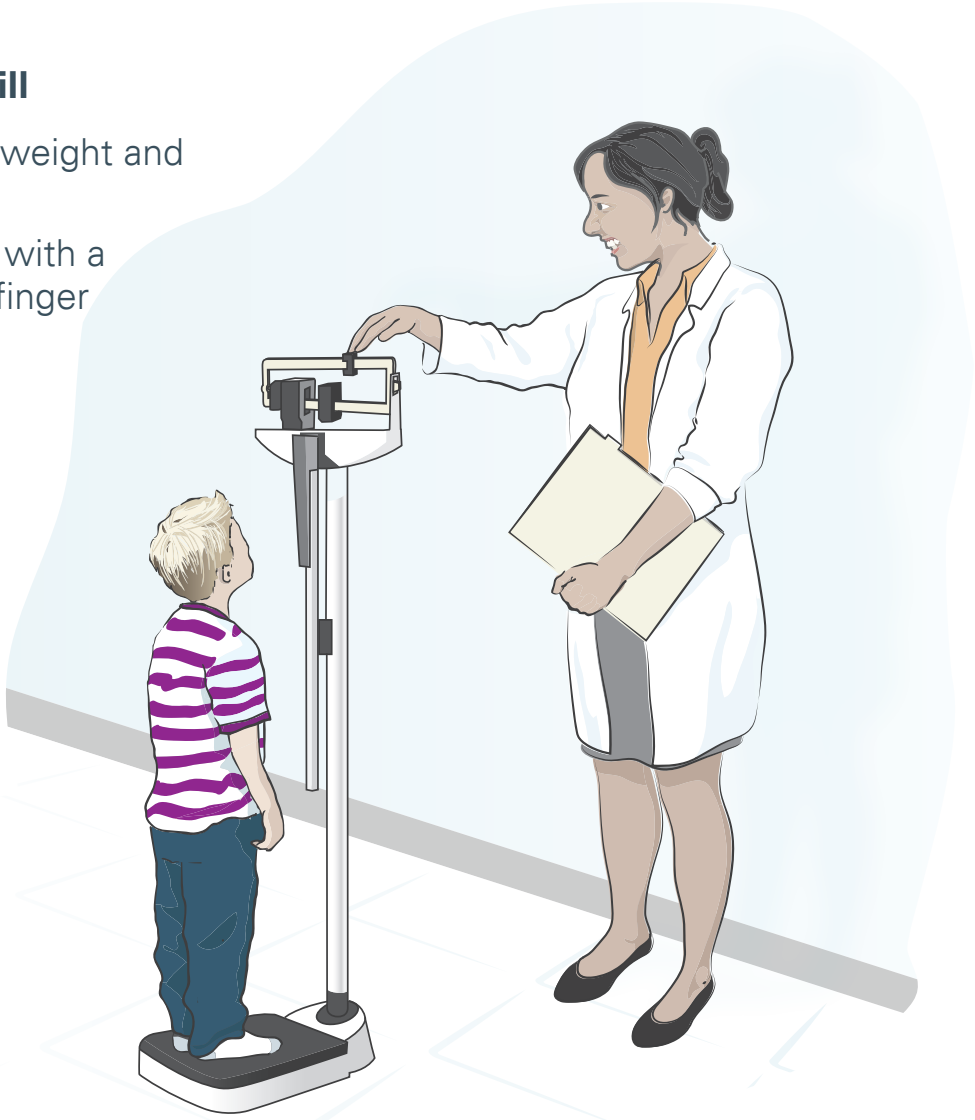
The diabetes follow-up with your diabetes doctor will preferably be in person, but can be on the phone, or video conference. It usually happens every 3 months.

You can ask to meet or call the nurse, the nutritionist, or the social worker at any time.

If you are going to the hospital for your clinic visit, go to A2 south clinic area.

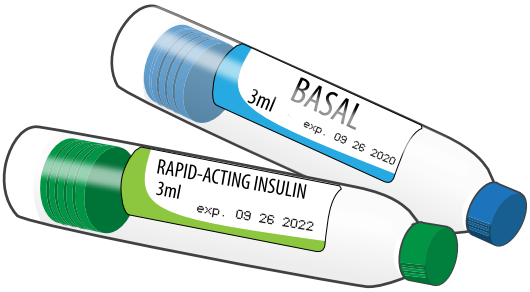
The nursing assistant will

- Measure your height, weight and blood pressure
- Measure your HbA1C with a blood drop from your finger



Remember to bring:

- ☐ Hospital and medical cards
- ☐ Glucometer with a lancet device
- ☐ Your logbook. Upload your continuous blood glucose monitor if you are using one.
- ☐ Insulin doses that you are using



Will I need a blood test during my clinic visit?

You will need a blood and urine test (thyroid, cholesterol) once a year or as needed. Your diabetes doctor will discuss this with you. This blood test can be done at the hospital or in your community.

You will need to book the blood test by making an appointment on Clic Santé. **https://portal3.clicsante.ca/**

How can you make the best of your diabetes clinic appointment?

- Have your blood sugar readings ready or upload your continuous blood glucose monitoring device if you are using one.
- Have the telephone and fax number of your pharmacy ready
- Fill the pre-visit questionnaire before the clinic appointment that you may have received by email. This questionnaire will help us to plan the visit better by responding to your specific needs.

More information about the HbA1C test:

What is the HbA1C (glycated hemoglobin)?

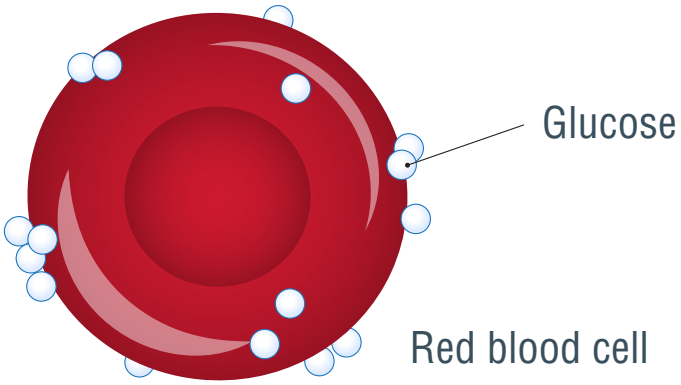
- The HbA1C measures what percentage of your hemoglobin is coated with sugar. Hemoglobin is a protein in the red blood cells that carries oxygen. Sugar attaches itself to the red blood cells. The more sugar there is in the blood, the higher the percentage of the HbA1C will be.
- This test gives a general idea of what your average blood glucose level was was for the past 2 to 3 months.

Glucose sticks to red blood cells.

Normal blood sugar = normal HbA1C
High blood sugar = high HbA1C

Healthy red blood cells have some glucose stuck to them.

When your child has high blood sugar, much more glucose sticks to the red blood cells. The HbA1C will be higher.



We would like your HbA1C test to be 7.5% or lower.

If the HbA1C result is higher than 10%, your diabetes team will speak with you about how to improve your diabetes management. Your diabetes team will ask if you forget insulin doses. We may ask you to have more follow-up appointments.

Aiming for HbA1C of 7.5 % or lower

HbA1C	Blood sugar average	HbA1C	Blood sugar average
5 %	5.4	10 %	13.3
6 %	7.0	11 %	14.9
7 %	8.6	12 %	16.5
8 %	10.2	13 %	18.1
9 %	11.8	14 %	19.7

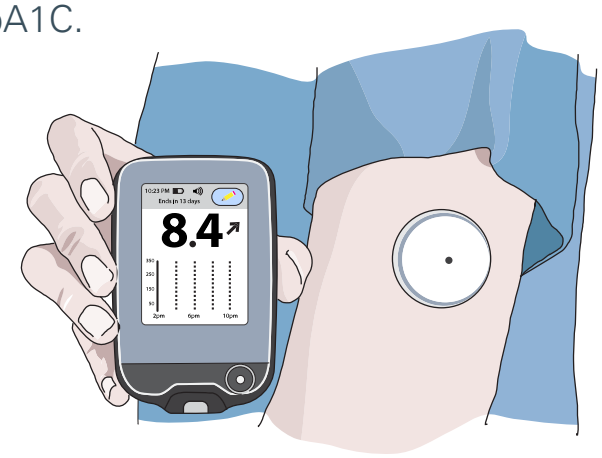
Are you using a continuous blood glucose monitor?

Another way of monitoring your blood sugar average is to look at the **time in range.** Time in range is the percentage of time that the blood sugar is between 4 and 10 mmol/L. Time in range is a more accurate and informative way of determining average blood sugars than HbA1C.

The goal is a time is range of 60%

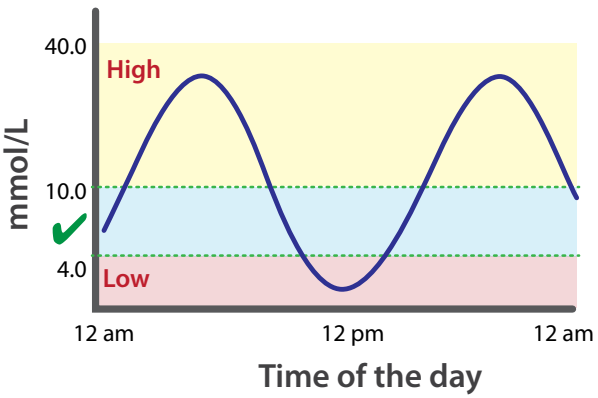
If you are using a continuous blood glucose monitor, are you uploading your device? Do you understand the information in the different reports?

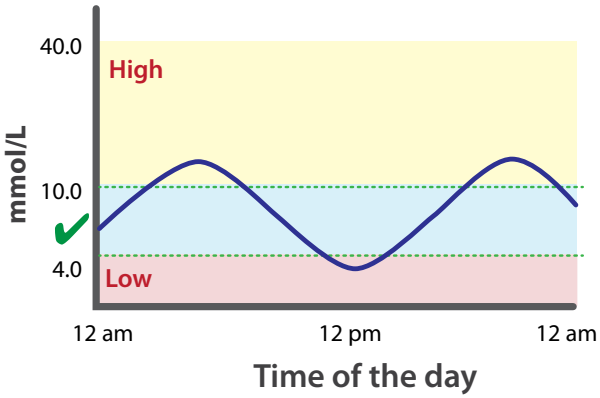
Contact your diabetes team if you want to learn more.



Here is an example to explain the difference between the HbA1C test and time in range.

Malik has an HbA1C test of 7.5%. Taylor also has an HbA1C test of 7.5% but the time in range test tells us more.





Look at the chart on the left.

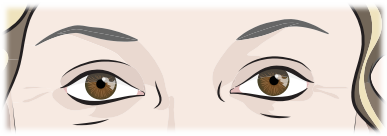
Malik's blood sugar was high (above 10 mmol/L) 40% of the time, it was low (below 4 mmol/L) 20 % of the time and in-range (between 4-10 mmol/L) 40% of the time. The Hb A1C result is 7.5%.

Now, look at the chart on the right.

Taylor's blood sugar was high (above 10 mmol/L) 25% of the time, it was low (below 4 mmol/L) 5 % of the time and in-range (between 4-10 mmol/L) 70% of the time. Taylor also had an hbA1C result of 7.5 %.

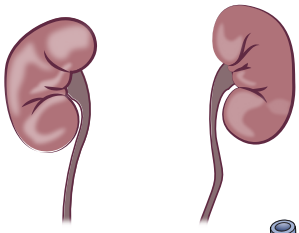
Even though they have the same HbA1C result, Taylor's blood sugars were more stable (meaning her blood sugar level stayed mostly in the target range).

Why is it important to have an HbA1C result of 7.5% and a time in range of 60%?



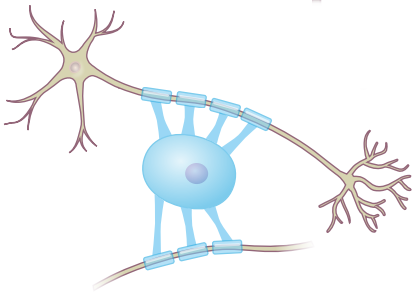
Keeping your blood sugars in this range decreases the risk of diabetes complications.

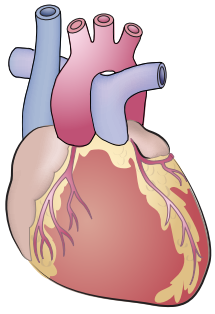
What kind of long term complications can you get from diabetes if not managed well?



The main complications of diabetes are:

- heart disease
- kidney disease
- eye damage
- nerve damage





This happens because hyperglycemia damages the small blood vessels in the body. Complications are more likely to happen if the blood sugar is high for long periods of time. Blood sugar variability (frequent highs and lows or changes in hyperglycemia and hypoglycemia patterns) may also lead to complications over the long term.

Keeping your blood sugar in the target range will decrease your chance of complications. Your doctor will do yearly screening for early detection of complications.

Keys to stack all the odds in your favour

- Support your child (listen, supervise, discuss the challenges, adjust the insulin doses)
- **Don't hesitate to give your child a break – at any age.** Take over blood sugar checks, keep track of blood sugars, help with insulin injections. It does not mean that your child is not able. It means that you are supporting your child.
- Diabetes is a family affair

Appendix

42 Factors *that affect* Blood Glucose

FOOD

- ↑↑ 1 Carbohydrate quantity
- →↑ 2 Carbohydrate type
- →↑ 3 Fat
- →↑ 4 Protein
- →↑ 5 Caffeine
- ↓↑ 6 Alcohol
- ↓↑ 7 Meal timing
- ↑ 8 Dehydration
- ? 9 Personal microbiome

MEDICATION

- →↓ 10 Medication dose
- ↓↑ 11 Medication timing
- ↓↑ 12 Medication interactions
- ↑↑ 13 Steroid administration
- ↑ 14 Niacin (Vitamin B3)

ACTIVITY

- →↓ 15 Light exercise
- ↓↑ 16 High-intensity & moderate exercise
- →↓ 17 Level of fitness/training
- ↓↑ 18 Time of day
- ↓↑ 19 Food and insulin timing

BIOLOGICAL

- ↑ 20 Too little sleep
- ↑ 21 Stress and illness
- ↓ 22 Recent hypoglycemia
- →↑ 23 During-sleep blood sugars
- ↑ 24 Dawn phenomenon
- ↑ 25 Infusion set issues
- ↑ 26 Scar tissue / lipodystrophy
- ↓↓ 27 Intramuscular insulin delivery
- ↑ 28 Allergies
- ↑ 29 A higher BG level (glucotoxicity)
- ↓↑ 30 Periods (menstruation)
- ↑↑ 31 Puberty
- ↓↑ 32 Celiac disease
- ↑ 33 Smoking

ENVIRONMENTAL

- ↑ 34 Expired insulin
- ↓↑ 35 Inaccurate BG reading
- ↓↑ 36 Outside temperature
- ↑ 37 Sunburn
- ? 38 Altitude

BEHAVIOR & DECISIONS

- ↓ 39 More frequent BG checks
- ↓↑ 40 Default options and choices
- ↓↑ 41 Decision-making biases
- ↓↑ 42 Family and social pressures

The arrows show the general effect these 42 factors seem to have on blood glucose based on scientific research and/or our experiences at diaTribe. However, not every individual will respond in the same way, so the best way to see how a factor affects you is through your own data: check your blood glucose more often with a meter or wear a CGM and look for patterns.

diaTribe

Read more about the 42 Factors at **diaTribe.org/42FactorsExplained**
Sign up for diaTribe's updates at **diaTribe.org/Join**

Insulin adjustment with snacks containing carbohydrates

1. Catherine's logbook for the past 7 days

2. After 7 days, we see a trend of hyperglycemia at supper in Catherine's logbook.

3. The breakfast and lunch blood sugars and bedtime are all within the target range.

TAUX DE SUCRE / Blood sugar (mmol/L)

	MATIN Bkft	COLLATION Snack	DÎNER Lunch	COLLATION Snack	SOUPER Supper	COLLATION Snack	COUCHER Bedtime	NUIT Night
	5.6		7.2	7.2	15.4		6.0	
	4.5		4.2	6.4	13.2		7.9	Check blood sugar 2 hours after a bedtime snack with carbo-hydrates
MER We	6.2		6.4	5.0	17.4		9.0	
JEU Th	7.4		6.3	7.1	16.7		7.4	
VEN Fr	8.0		5.9	6.5	14.8		8.3	
SA	4.8		4.9	5.4	12.3		7.5	
DIM Su	5.7		6.7	4.8	16.1		8.7	

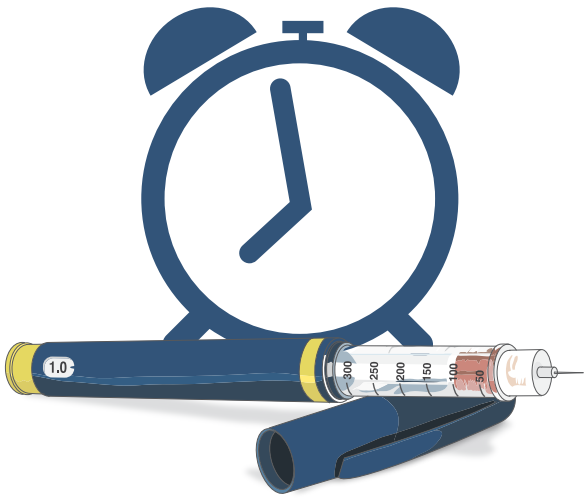
FACTEURS QUI INFLUENCENT LA GLYCÉMIE / Factors that affect the blood sugar.

ACTIVITÉ PHYSIQUE* Physical activity*	RESTAURANT, FÊTE Restaurant, party	HYPO
__:__	__:__	
__:__	__:__	__:__
__:__	__:__	__:__
__:__	__:__	__:__
__:__	__:__	__:__
__:__	__:__	__:__
__:__	__:__	__:__

COMMENTAIRES / Comments :

* MARCHE, ÉDUCATION PHYSIQUE, SPORTS Walk, gym class, sports

4. The blood sugars before supper are not between 4 and 8 mmol/L. So, let's see what is happening just before supper.



5. What is Catherine's meals and snacks schedule?

Breakfast is at 7:00
Lunch is at 12:00
Afternoon snack is at 16:00
Supper at 19:00
Bedtime 22:00

In the afternoon, Catherine eats snacks with carbohydrates and takes insulin.

6. What are Catherine's insulin doses?

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FMU-0638

Insulin dose sheet
Rapid-acting insulin

Breakfast Sliding scale for clear rapid-acting insulin ( ) pen colour _____

Blood sugar (mmol/L)	Units	Special notes
3.9 or less	5	Treat hypoglycemia first. When corrected give this dose.
4.0 – 8.0	6	
8.1 – 12.0	7	
12.1 – 17.0	8	
17.1 or more	9	Check for ketones

Snack Fixed dose clear rapid-acting insulin ( ) pen colour _____

Blood sugar (mmol/L)	Units
4 or more	2

Lunch Sliding scale for clear rapid-acting insulin ( ) pen colour _____

Blood sugar (mmol/L	Units	Special notes
3.9 or less	6	Treat hypoglycemia first. When corrected give this dose.
4.0 – 8.0	7	
8.1 – 12.0	8	
12.1 – 17.0	9	
17.1 or more	10	Check for ketones

Snack Fixed dose clear rapid-acting insulin ( ) pen colour _____

Blood sugar (mmol/L)	Units
4 or more	2

Supper Sliding scale for clear rapid-acting insulin ( ) pen colour _____

Blood sugar (mmol/L)	Units	Special notes
3.9 or less	4	Treat hypoglycemia first. When corrected give this dose.
4.0 – 8.0	5	
8.1 – 12.0	6	
12.1 – 17.0	7	
17.1 or more	8	Check for ketones

Snack Fixed dose clear rapid-acting insulin ( ) pen colour _____

Blood sugar (mmol/L)	Units
6 or more	2

Bedtime Fixed dose clear basal-acting insulin ( ) pen colour _____

Units
14

Parents have received training to adjust the insulin. They are skilled in changing insulin dosages according to the child's needs.

	Name in print letters	Signature	Date YYYY/MM/DD
Health care professional			

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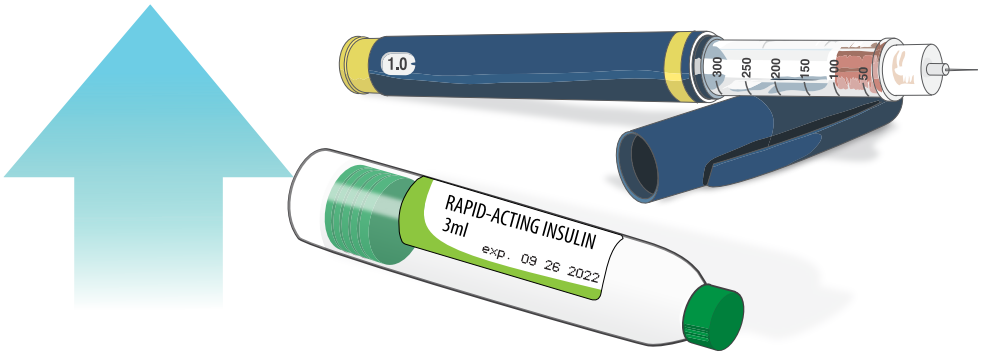
7. Which insulin do you need to adjust?

The hyperglycemia is before supper. The last time she injected insulin was before the afternoon snack. So, Catherine's afternoon snack rapid-acting insulin dose needs to be increased.



8. By how much to adjust?

Since her insulin dose is between 0-10 units, she will increase the afternoon snack rapid-acting insulin dose by 0.5 units. Her new afternoon snack rapid-acting insulin dose will be: 2.5:

Catherine's new afternoon rapid acting-insulin dose: 2.5 units

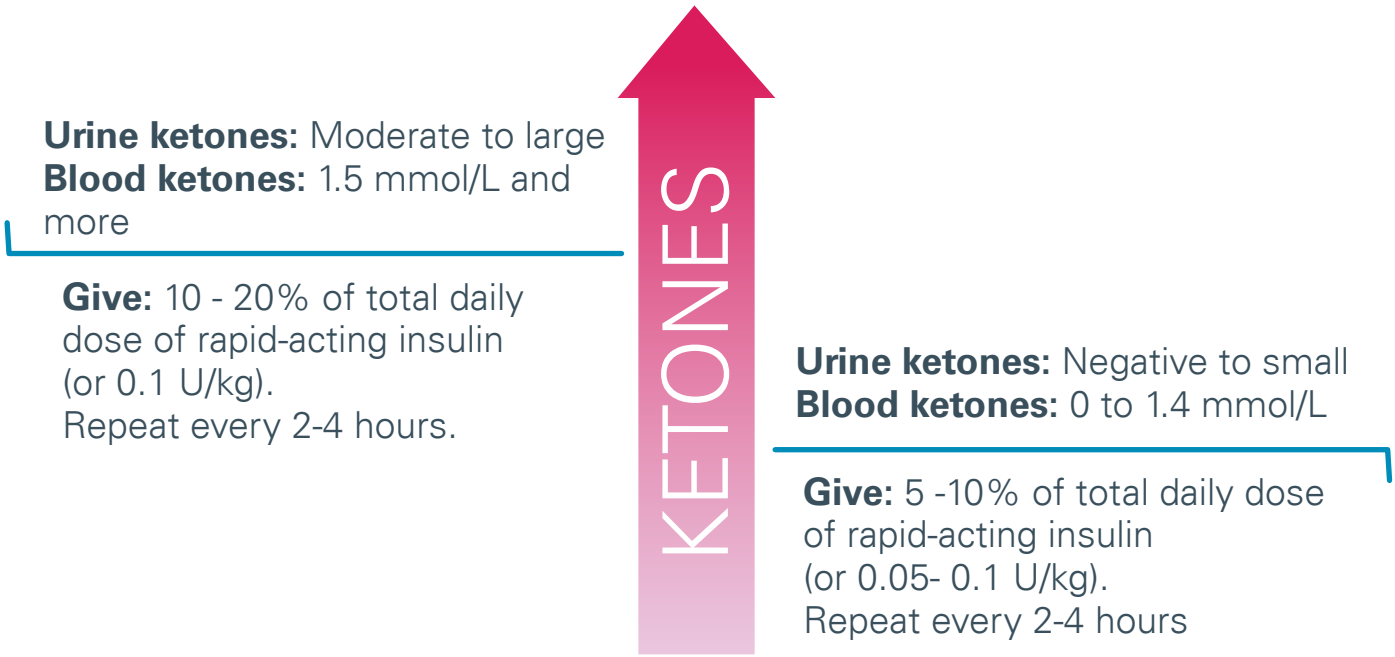
Ketone Management

With diabetes, the lack of insulin causes your body to use fat as a source of energy. **Burning fat releases ketones** in the blood and makes the blood acidic. This build-up of ketones is called diabetic ketoacidosis (DKA).

Ketones are measured in the blood or urine **if the blood sugar is more than 17 mmol/L.** The treatment for ketones is to give extra rapid-acting insulin. The extra rapid-acting insulin dose is added to your usual dose. To calculate the extra rapid-acting insulin dose, you need to answer the following questions:

1. What is the amount of blood or urine ketones?

Blood sugar is more than 17 mmol/L



Extra rapid-acting insulin can also be given if the blood sugar is above 17 mmol/L with no ketones. This is called a correction dose. This can be discussed with the diabetes team.

Even if there are ketones, do not give extra-rapid acting insulin if the blood sugar is less than 8 mmol/L. Encourage your child to eat and drink more.

If you are worried about your child's diabetes management, call the diabetes doctor on call.

2. How do you calculate the total daily dose?

To calculate the total daily dose, add your child's usual insulin doses taken in one day. To determine the usual insulin rapid acting dose, you should choose the dose on the rapid acting scale between 4.0-8.0 mmol/L

rapid-acting insulin + basal-acting insulin.

3. How do you calculate the extra rapid-acting insulin dose?

The extra rapid-acting insulin dose is added to your usual dose. Use the following table to calculate the dose.

Total Daily Dose (TDD)	5 % of TDD	10 % of TDD	15 % TDD	20 % of TDD
5-15 units	½ unit	1 unit	1½ units	2 unit
16-25 units	1 unit	2 units	3 units	4 units
26-35 units	1½ units	3 units	4½ units	6 units
36-45 units	2 units	4 units	6 units	8 units
46-55 units	2½ units	5 units	7½ units	10 units
56-65 units	3 units	6 units	9 units	12 units
66-75 units	3½ units	7 units	10½ units	14 units
76 units and above	4 units	8 units	12 unit	16 units

4. How much insulin should you give?

Give the insulin dose according to your usual insulin scale + the extra rapid-acting insulin dose calculated.

For example

Sandra is sick with a fever. Her blood sugar is 19.8 mmol/L before breakfast, and she has 1.7 mmol/L of blood ketones. She can eat and drink small amounts.

Step 1. Find out the amount of blood or urine ketones.

Blood sugar is more than 17 mmol/L ☑

Urine ketones: Negative to small ☐ Moderate to large ☑
Blood ketones: 0 to 1.4 mmol/L 1.5 mmol/L and more

Remember, for blood sugar, 17 mmol/L or more and blood ketones 1.5 mmol/L or more, give 10 to 20% of TDD

Step 2. Calculate Sandra's total daily dose

Answer: Her usual morning dose is 6 units of rapid-acting insulin. Her usual lunch time dose is 5 units of rapid-acting insulin. Her supper dose is 4 units of rapid-acting insulin and bedtime dose is 5 units of basal-acting insulin Sandra also takes 1 unit of rapid-acting insulin with her snacks. See her insulin dose sheet:

Her total daily dose (TDD) = 6+1+5+1+4+1+5= 23 units

Step 3. How do you find Sanrda's extra rapid-acting insulin dose?

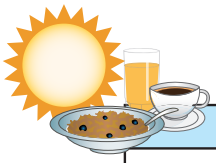
Remember that her TDD dose is 23.
Look at the units on the left.
23 is between 16 and 25.

Total Daily Dose (TDD)	5 % of TDD	10 % of TDD	15 % TDD	20 % of TDD
5-15 units	½ unit	1 unit	1½ units	2 unit
16-25 units	1 unit	2 units	3 units	4 units
26-35 units	1½ units	3 units	4½ units	6 units
36-45 units	2 units	4 units	6 units	8 units
46-55 units	2½ units	5 units	7½ units	10 units
56-65 units	3 units	6 units	9 units	12 units
66-75 units	3½ units	7 units	10½ units	14 units
76-85 units	4 units	8 units	12 unit	16 units

The extra rapid-acting insulin dose, according to the table, is 2 or 3 or 4 units.

Step 4. How much insulin to give?

Your dosage



Breakfast: Sliding scale for clear **rapid-acting insulin** ( ) pen colour:_____

Blood sugar	Units	Special Note
3.9 or less	5	Treat low first. When corrected give this dose.
4.0 - 8.0	6	
8.1 - 12.0	7	
12.1 - 17.0	8	
17.1 or more	→ 9	Do blood ketone test

Give the insulin dose according to the usual insulin scale = 9 units and add the extra rapid-acting insulin dose to the current insulin scale.

Since the amount of ketones is more than 1.5 mmol/L, give 10-20% of the total daily dose. To be on the safe side, start with the smallest percentage and repeat in 2-4 hours.

9+2 = 11 units of rapid-acting insulin
Give 11 units of rapid-acting insulin dose before breakfast

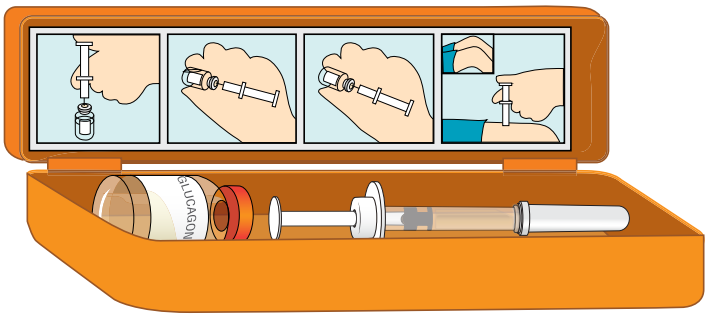
MINI-DOSE OF GLUCAGON/GLUCAGEN PROTOCOL

Glucagon is a hormone. Glucagon works by "telling" your liver to release sugar into the blood to bring the blood sugar level up.

When should you give a mini-dose of Glucagon/Glucagen

If hypoglycemia is due to

- Gastrointestinal bug with vomiting and/or diarrhea
- Not eating enough carbohydrates
- Gave too much insulin by mistake

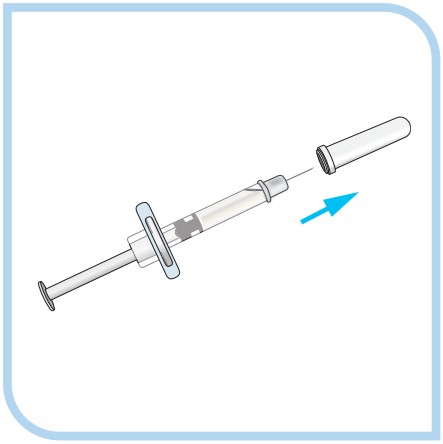


What do you need

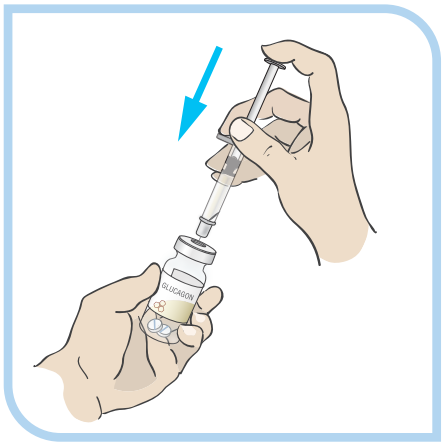
- Glucagon/Glucagen emergency kit (1mg/ml)
- Insulin syringe

How do you give the mini-dose of Glucagon/Glucagen

1.



a) Remove the needle cover on the glucagon/ glucagen syringe.



b) Inject the liquid of the syringe into the glucagon/glucagen syringe. Then discard this syringe.

c) Mix gently (dissolves rapidly).

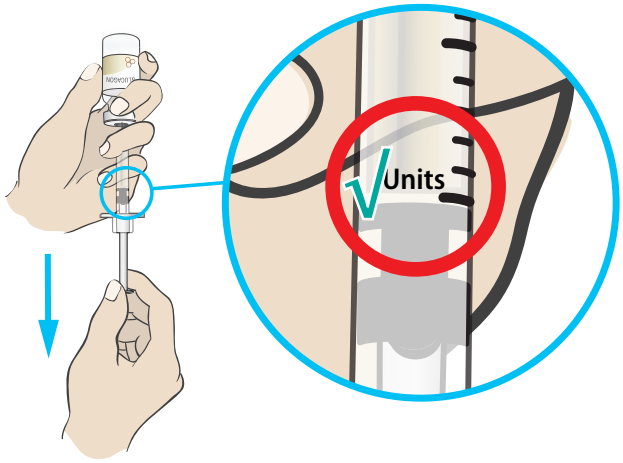
2. Follow the chart below to calculate the mini-dose of glucagon.

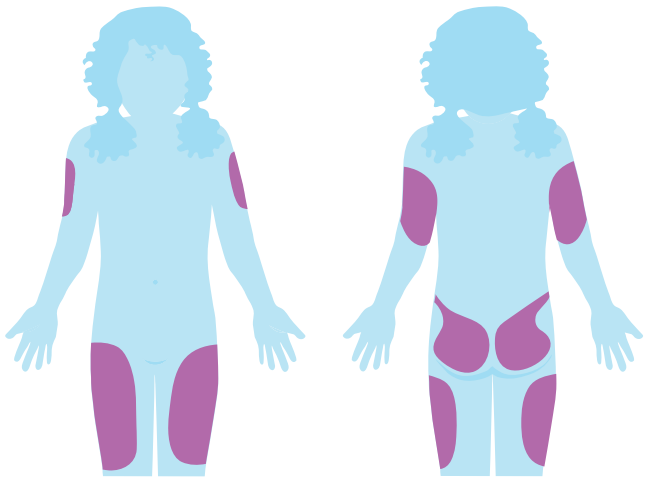
Mini-dose of glucagon			
Age	**Dose (in units)**	**Age**	**Dose (in units)**
Younger than 2 years old	2	9 years	9
2 years	2	10 years	10
3 years	3	11 years	11
4 years	4	12 years	12
5 years	5	13 years	13
6 years	6	14 years	14
7 years	7	15 years	15
8 years	8	16 years and older	15

1 unit of glucagon = 10 micrograms of glucagon

Max dose = 15 units (do not give more than 15 units for the first dose)

3. Use the insulin syringe to remove the glucagon/glucagen dose.

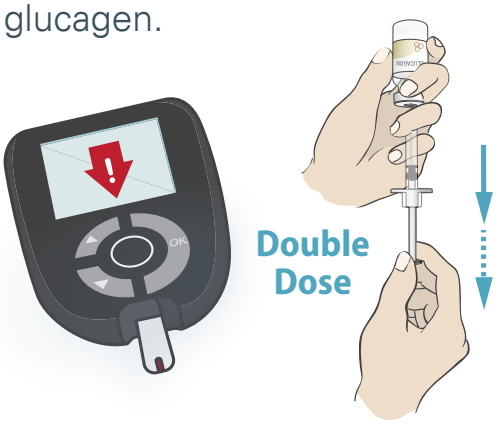




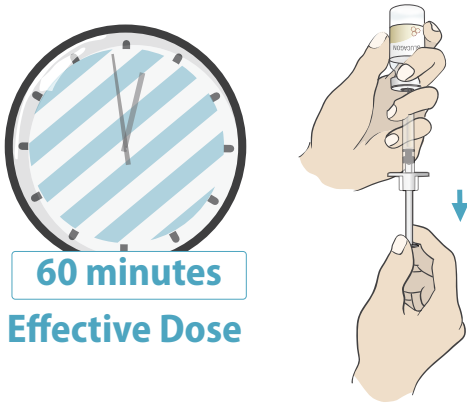
4. Inject the glucagon/glucagen in the same sites as an insulin injection.

5. Check the blood sugar in 15 minutes and then every 30 minutes until the blood sugar is above 4.0 to 6.0 mmol/L

6. If the blood sugar is less than 5.0 mmol/L after 30 minutes, give double the dose of glucagon/ glucagen.



Double Dose: 2 years and under: give 4 units; Over 2 years: give 2 units per year of age. Maximum dose of 30 units



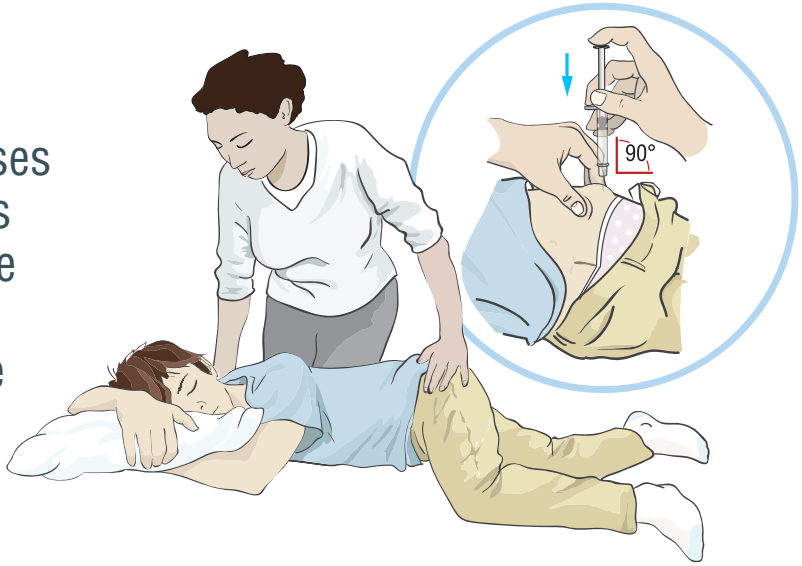
7. The effective dose may be repeated every 60 minutes.

Do not give your child more than 5 mini-doses in 24 hours. If your child needs more, call the doctor on call or go to the emergency department.

8. Once the glucagon has been mixed, keep it in the fridge. Throw it away after 24 hours.

Make sure that you go to the pharmacy to replace the glucagon/glucagen emergency kit.

Important: If your child loses consciousness (passes out), is having convulsions or cannot swallow, give the complete emergency dose of glucagon/glucagen. Use the syringe that is in the emergency kit.



When should you contact the doctor on call when your child is sick?

- Do not know how much insulin to give
- Your child is under 5 years old
- Unable to keep the blood sugar above 4 mmol/L
- Cannot drink or eat anything because of vomiting, nausea or not being hungry.
- Ketones are still in the blood or urine after 1 or 2 extra doses of insulin
- Ketones are present but the blood sugar is below 8.0 mmol/L
- Signs of high level of ketones: weakness, fatigue, stomach pain and rapid breathing.
- Any time you are worried about your child's diabetes!

Travel Tips and Letter

Travel advice if changing time zone

2 weeks before departure, contact diabetes nurses with:

- Download the continuous blood glucose monitor (if using) or 2 weeks of blood sugar
- Insulin doses
- Flight itinerary

You will need a signed letter to travel with your insulin medication and go through airport security. You should have received one when you were first diagnosed. If you have not received one, contact the diabetes secretary.

THIS LETTER HAS NO EXPIRATION DATE

To whom it may concern:
This traveller has type 1 diabetes.
This is a permanent condition that causes life-long insulin deficiency.

This traveller must bring insulin in their carry-on luggage. Insulin is a life-saving hormone that helps maintain normal blood sugar levels in the body. People with type 1 diabetes need insulin injections every day to manage their blood sugar levels.

People with type 1 diabetes also need to monitor their blood sugar levels either through finger prick testing or continuous blood glucose monitoring. **The continuous blood glucose monitor is inserted under the skin and cannot be removed.** The diabetes team advises travellers to bring double the supplies they need in case of loss, theft, or malfunction.

These are the supplies they may have in their carry-on:

- Blood glucose meter, lancet device, lancets, glucose and ketone strips, alcohol swabs
- Sensors for continuous glucose monitoring device
- Insulin, insulin pens, insulin syringes, needles
- Juice, sugar tablets, candies (skittles, rockets) and snacks
- Glucagon /glucagen (a prescription medication to treat severe low blood sugar causing unconsciousness)
- Copy of travel insurance, all prescribed medication and insulin doses
- Sharps container

DO NOT EXPOSE THE CONTINUOUS BLOOD GLUCOSE MONITORING DEVICE TO X-RAYS, TOTAL BODY SCANS OR METAL DETECTORS (WALK-THROUGH OR HAND-HELD).

X-rays and electromagnetic fields can damage the device, causing serious risk to the traveller.

The Canadian Air Transport Security Authority recommends that an individual who wears a continuous blood glucose monitor device should tell the security officers so that a physical search may be performed.

This letter also confirms that this traveller is safe to travel and lead a normal life. Should further information be required, please contact us at (514) 412-4436.

Notes