

St. Michael's

Inspired Care.
Inspiring Science.

Starting insulin

A guide for patients and families



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Starting insulin

Blood sugar targets	
Fasting or before a meal:	4.0 to 7.0
2 hours after a meal:	5.0 to 10.0
My targets:	
Fasting	
2 hours after a meal	

Multiple daily injections

Meal insulin

- Rapid acting (take up to 15 min before meals) _____
_____ units with breakfast
_____ units with lunch
_____ units with dinner
- Short acting (take 30 min before meals) _____
_____ units with breakfast
_____ units with lunch
_____ units with dinner

OR

Basal insulin

- Long acting _____
_____ units at _____
- Intermediate _____
_____ units at _____
_____ units at _____

Starting pre-mixed insulin

Blood sugar targets	
Fasting or before a meal:	4.0 to 7.0
2 hours after a meal:	5.0 to 10.0
My targets:	
Fasting	
2 hours after a meal	

Type of pre-mixed insulin

Insulin name _____

_____ units at _____

_____ units at _____

Diabetes and insulin

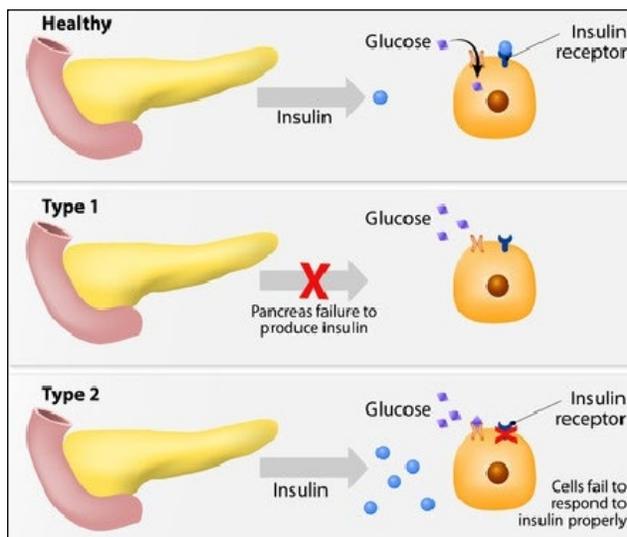
Diabetes is a condition where your body cannot properly use the food you eat for energy. Much of the food you eat gets broken down into glucose (sugar) and goes into your blood. Then insulin moves the sugar from your blood into your cells, so your body can use it for energy. Insulin is a hormone made by your pancreas. Before diabetes, your pancreas would make a small amount of insulin all day and night. It would also make a larger amount of insulin when you ate a meal or snack.

There are two types of diabetes:

- **Type 1 diabetes:** Your pancreas is unable to make any insulin
- **Type 2 diabetes:** Your pancreas does not make enough insulin or the body cannot use the insulin well or both

This means that sugar will start to build up in your blood, resulting in high blood sugar levels.

Taking insulin for diabetes

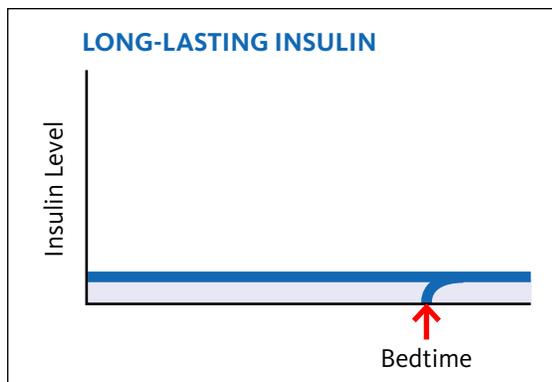


Diabetes Mellitus

Your doctor has recommended insulin to help you control your blood sugar levels. Insulin and a healthy lifestyle can help you manage your diabetes.

How basal insulin works

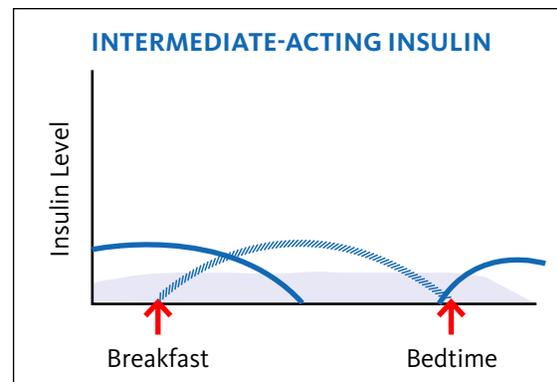
Long acting insulin, also called basal insulin, slowly releases a small amount of insulin into your body. This type of insulin is made to copy the way your pancreas would normally release insulin. Basal insulin prevents your liver from making too much sugar during the day and overnight.



Long Acting (*Lantus*[®], *Toujeo*, *Levemir*[®])

In the picture above, the shaded area is the amount of insulin normally made by your pancreas. The dark line shows how long acting insulin works in a similar way. Toujeo may last longer than Lantus or Levemir.

- Take long acting insulin at the **same time** each day. Normally this insulin is taken **before bed**, but your doctor may tell you to take it at a different time of day.
- Talk to your doctor or health care professional if your blood sugar goes to low or high.



Intermediate (*Humulin*[®] N, *Novolin NPH*)

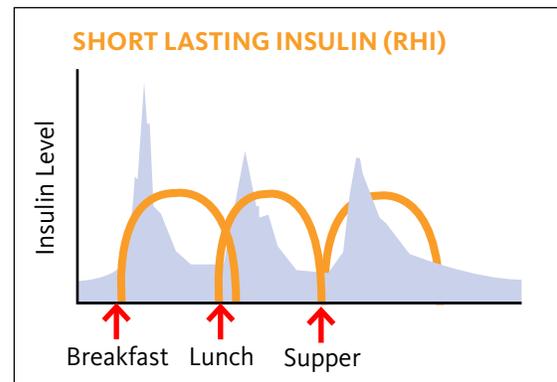
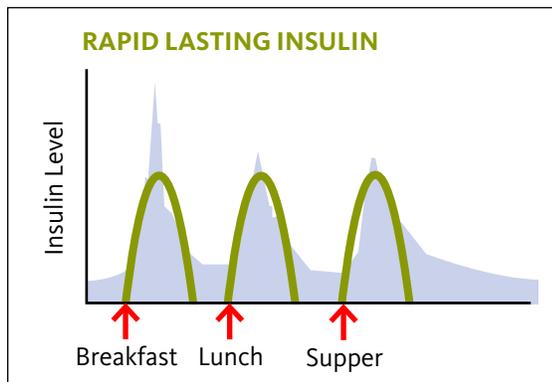
In the picture above, the shaded area shows the amount of insulin your pancreas normally makes. The curves show the two injections of intermediate insulin you take each day.

- Intermediate insulin is usually taken once or twice a day, **before breakfast and/or at bedtime**.
- It is important to **have your meals and snacks on time**. This is because intermediate insulin does not match the insulin your pancreas normally makes as well as long acting insulin.

How bolus insulin works

Bolus (mealtime) insulin is taken just before eating. It works by quickly releasing insulin into your body to lower your blood sugar after eating. When taking this insulin it is important to:

- Eat 3 meals a day
- Space your meals 4 to 6 hours apart
- Do not skip or delay meals
- Meals should include a carbohydrate such as:
 - Starchy food like rice, potatoes, pasta or bread
 - Fruit, sweet vegetables, milk or yogurt



Apidra[®], Novorapid[®], Humalog[®]

In the picture above, the shaded area is the amount of insulin normally made by the pancreas when eating 3 meals per day.

Rapid acting insulin closely matches the insulin your pancreas would normally make when you eat a meal.

- Take rapid acting insulin **just before or up to 15 minutes** before meals.

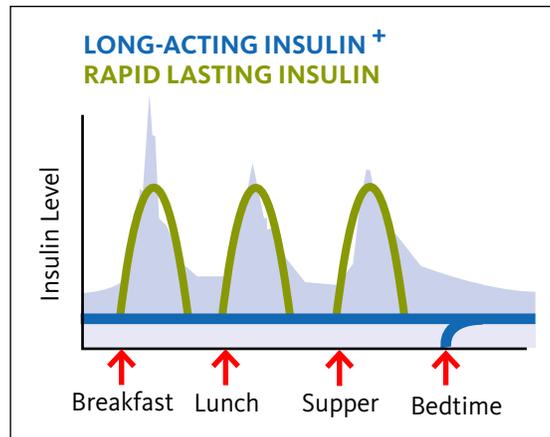
Humulin[®] R, Regular Novolin[®] ge Toronto

As you can see in the picture, short acting insulin does not match as closely to the insulin your pancreas would normally make when you eat. Short acting insulin lasts a little longer than rapid acting insulin, and takes a little longer to start working.

- Take short acting insulin **30 minutes** before a meal.

Multiple Daily Injections (MDI)

Multiple daily injections use both basal and bolus (mealtime) insulin. You take long acting insulin once a day (in the morning or at night before bedtime). You also take rapid acting insulin 10 to 15 minutes before each meal. This pattern best matches how your pancreas should release insulin.



Your schedule for multiple daily injections

Basal Insulin name _____

_____ units at _____

Bolus Insulin name _____

_____ units at breakfast

_____ units at lunch

_____ units at dinner

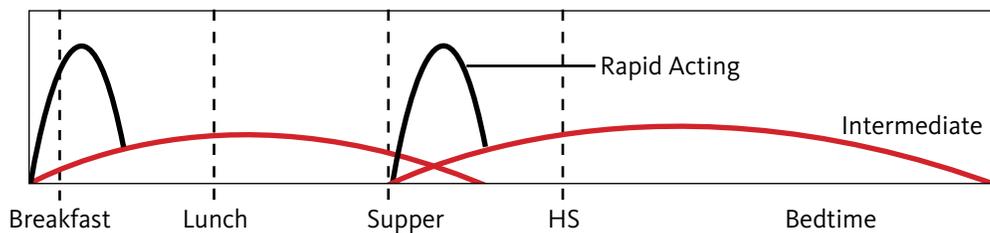
Pre-mixed insulin

Pre-mixed insulin is a mix of intermediate insulin with rapid or short acting insulin. It copies both the mealtime release of insulin and the slow, steady basal release of insulin from the pancreas. Pre-mixed insulin is usually taken **before breakfast** and **before dinner**.

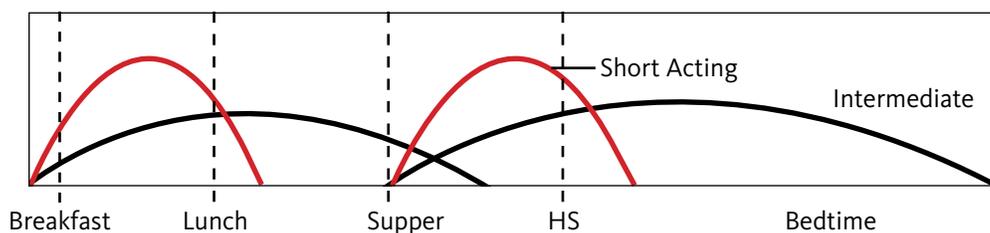
- Insulin injections should be spaced 12 hours apart, if possible.
- Do not skip meals or your bedtime snack.
- Remember to gently mix this insulin 10 to 20 times before injecting.

How it works

Rapid+Intermediate (eg. Humalog® Mix 25, Humalog® Mix 50 or NovoMix 30)



Short-Acting + Intermediate (eg. Humulin® 30/70 or Novolin 30/70)



Your schedule for pre-mixed insulin

Insulin name _____

_____ units at _____

_____ units at _____

Where to store insulin

- Keep unopened insulin in the refrigerator.
- Unopened insulin can be stored in the refrigerator until the expiry date.
- Keep the insulin you are using at room temperature.
- Insulin is good for 30 days at room temperature. Exceptions are:
 - Lantus, which is good for 28 days
 - Levemir, which is good for 42 days
 - Toujeo, which is good for 42 days
- Write the date on the insulin when you open it.
- Replace the cartridge after 28 to 30 days or longer for some insulins listed above even if there is some insulin left in the pen.
- Avoid extreme temperatures (for example, in the car in the summer or winter months)
- **Do not** freeze insulin or warm it in the microwave.

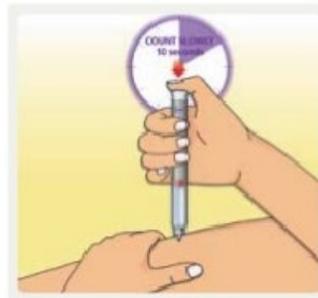


How to use an insulin pen

1. Put the insulin cartridge into the insulin pen (unless you have a prefilled pen).
2. Attach the needle to the insulin pen.
3. For intermediate (cloudy) insulin (Humulin N or Novolin NPH) or pre mixed insulins (Humalog Mix 25, Humalog Mix 50, Humulin 30/70, Novolin 30/70 and Novomix 30): Mix the insulin by gently turning upside down 20 times.
Do not shake insulin.

4. Remove air in needle:

- a. Remove the two needle caps
- b. Dial 2 units
- c. Point the needle up
- d. Push the injection button
- e. Look for a few drops of insulin at the tip of the needle
- f. Repeat dialing 2 units until you see the insulin drops forming

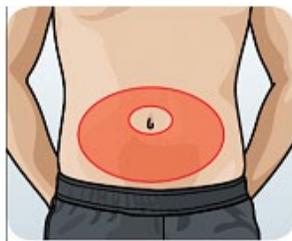


5. Dial your dose of insulin (see chart on front).
6. Inject your dose of insulin:
 - a. Insert the needle straight (90 degrees) into your skin
 - b. Push the injection button until the dial goes to zero
 - c. Hold the needle in skin for 10 seconds
 - d. Pull the needle out, put the cover on
 - e. Dispose of the needle in a sharps approved container
7. Put the cap on the insulin pen and store at room temperature.

Where to inject insulin

Problems can happen when you inject insulin into one spot too often. One of these problems is called lipohypertrophy. Lipohypertrophy can be puffy or feel like a hard or spongy lump under the skin. If you inject into these areas your insulin may not work properly. The best way to avoid getting lipohypertrophy is to change the spot where you inject each time you do an injection.

- Do not inject through clothes.
 - Do not inject insulin into exercising muscles. For example, do not inject into the thigh and then plan to go for a walk or run shortly afterwards.
1. Choose a site for the injection.
 2. Select a zone about the size of a postcard to use for 1 week.



Abdomen



Upper-Outer Thigh

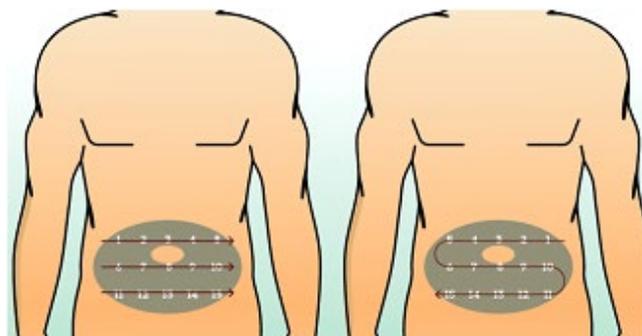


Buttock



Upper-Outer Arm

3. Select a rotation pattern to follow.
4. Inject insulin 1 finger width away from the last injection.
5. Use your injection pattern to avoid injecting in the same place twice.
6. Move to the next zone when you have finished the injection pattern.



Grid and zig-zag rotation patterns.

Taking control of your diabetes

Your diabetes team is your partner to help you make a plan to manage your diabetes. It may take a while to learn how the food you eat, the activities you do and your lifestyle choices affect your blood sugar. We are here to support you and help you feel more confident in managing your diabetes. This process is called self-management.

It is important to read the following self-management sections to understand how to take good care of yourself.

Remember: your health care team is here to support you as you learn to manage your diabetes

Tools you will need to manage your diabetes:

1. Learn to use your meter and ask your health care professional when you should test your blood sugars.
2. Ask for a logbook or learn to upload your meter. Bring your printed information to your appointment.
3. Create a communication plan with your diabetes nurse and dietitian educator.
4. Ask for help if you need it.
5. Look for trends in your blood sugar levels. Learn how to safely adjust your insulin in between appointment times.

Dietary management

Carbohydrate

Our food is made up of protein, fat and carbohydrate. Foods that contain carbohydrate have the biggest effect on our blood sugar. When we eat foods that contain carbohydrate, our body turns the carbohydrates into sugar and that sugar goes into our blood.

What foods contain carbohydrates

There are 4 main types of food that contain carbohydrate:

1. Starchy foods (For example: bread, rice, pasta, corn, potatoes, cereal)
2. Fruits and sweet vegetables (For example: apples, bananas, berries, squash, beets)
3. Milk products (For example: milk, yogurt)
4. Sugary foods (For example: fruit juice, regular pop, ice cream, honey, sugar)

How much carbohydrate should I eat?

The amount of carbohydrate you need depends on your weight and activity level. When taking insulin, it is very important to eat a consistent amount of carbohydrate:

- Try to spread your carbohydrate out over your 3 meals
- Keep the carbohydrate amount the same from one day to the next.

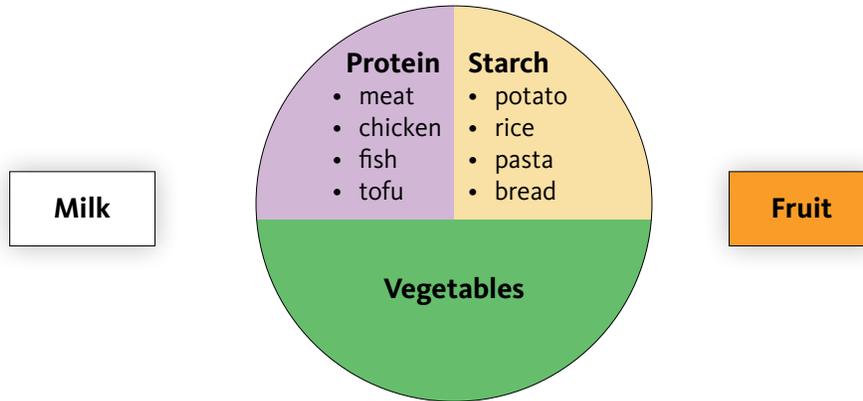
If you have less carbohydrate at your meal one day or skip a snack that you were asked to eat, your blood sugar could go too low (hypoglycemia). For more information on hypoglycemia, see the next section.

What if I do not want to eat foods that contain carbohydrate with my meal?

Do not take your meal insulin if you are having a meal with no carbohydrate. For example, if you are having bacon and eggs for breakfast or a green salad with grilled chicken for lunch, do not take any meal insulin for that meal.

Example of what your plate should look like.

Half of your plate should be vegetables, one quarter should be protein, and one quarter should be starch. Add 1 serving of fruit and/or 1 cup of milk with your meals.



How much starch should I have?

A few examples of how much starch to include at a meal would be:

- 1 cup of pasta or 2/3 cup rice
- 2 slices of bread or 2 egg-size potatoes.

What is one serving of fruit?

A few examples of one serving of fruit is :

- 1/2 banana , 1 apple, 1 pear, 1 cup blueberries, 2 cups of strawberries/ raspberries, 15 grapes/cherries or 1 cup cantaloupe/pineapple.

What should I eat for breakfast?

Make sure you have starchy foods with your breakfast insulin. Here are two examples of a meal you could have for breakfast.

Sample Breakfast 1	Sample Breakfast 2
2/3 cup cooked oatmeal	2 slices of toast
1 cup strawberries	2 eggs
1/2 cup yogurt	1 peach

Hypoglycemia

What is hypoglycemia (low blood sugar)?

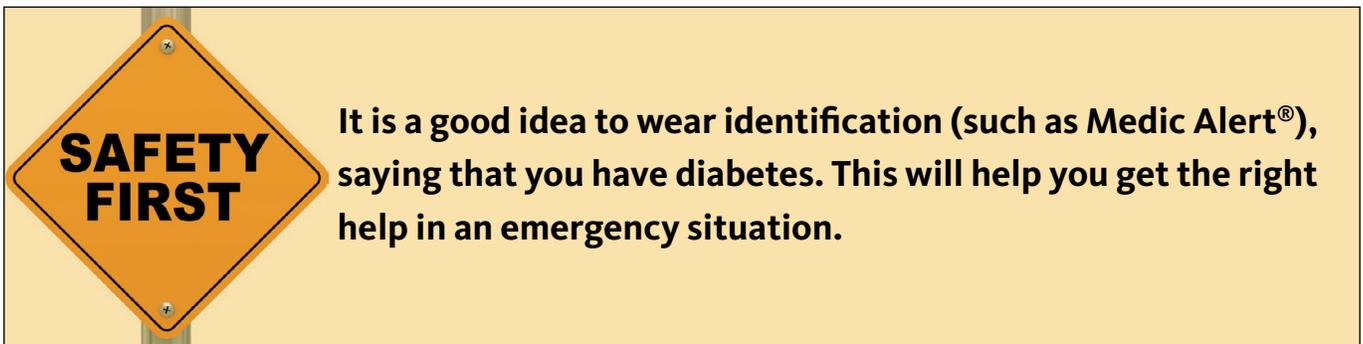
- A blood sugar less than 4 mmol/L
- Symptoms of a low blood sugar

What are the symptoms of low blood sugar?

- Sweating
- Tingling
- Shaking
- Dizziness
- Hunger
- Palpitations (rapid or irregular heart beat)
- Weakness
- Headache
- Confusion
- Difficulty concentrating
- Difficulty speaking
- Loss of consciousness

What causes low blood sugar?

- Too much diabetes medications or insulin
- Missed or delayed meals
- Eating less than normal
- Increased or unexpected activity
- Alcohol



Hypoglycemia treatment steps

Step 1

- Test your blood sugar (If you have symptoms but cannot test at that time, be safe and treat it as a low blood sugar)

Step 2

Treat with a source of fast acting sugar like:	If blood sugar is 3 to 4 mmol/L, take 15g of sugar	If blood sugar is less than 3 mmol/L, take 20g of sugar
Glucose tablets	4 glucose tablets	5 glucose tablets
Sugar	3 to 4 teaspoons dissolved in water	4 to 5 teaspoons dissolved in water
Juice or regular pop	175 ml (3/4 cup) juice or regular pop	250 ml (1cup) juice or regular pop
Life Savers	6 Life Savers (chew)	8 Life Savers (chew)
Honey/Syrup	3 to 4 teaspoons	4 to 5 teaspoons

Step 3

- Wait 15 minutes.
- Test your blood sugar again.
- Repeat Step 2 until your blood sugar comes back above 4 mmol/L

Step 4

- Eat your meal or have a snack if your meal is more than 1 hour away.
- If you take insulin and your last dose was **less than 4 hours ago**, you may still have active insulin in your body (also known as “insulin on board”). You will need to eat extra carbohydrate to balance the insulin on board.

After you have successfully treated your low blood sugar

Think about what caused the low blood sugar and how to prevent it. If you have 2 to 3 low blood sugars a week, see your doctor or diabetes educator.

When and how to adjust your BASAL insulin

Your bedtime insulin is: _____

- Your blood sugar in the morning, before breakfast should be between 4.0 to 7.0.
- If your blood sugar is above 7.0 for two days in a row, you need to increase your basal insulin dose.
- Increase your basal insulin by 1 unit every day until your blood sugar is 7.0 or less or as instructed by your doctor or diabetes team.
- Example: You are taking 10 units of insulin.

Day	Insulin Taken at Bedtime	Blood Sugar Before Breakfast	Required Action
1	10 units	8.6	No action (wait 1 day)
2	10 units	8.5	Add 1 unit
3	11 units	8.1	Add 1 unit
4	12 units	7.4	Add 1 unit
5	13 units	6.7	No action (less than 7)
6	13 units	6.8	No action (less than 7)

Once you get the right dose that gives your target blood sugar in the morning, stop increasing your insulin. This will be your new dose. Everyone needs different doses of insulin. To get your morning blood sugar into the target range, you may have to take a lot more insulin than when you started.

****Please do not use this table if you are on toujeo
Your health care worker will tell you how to adjust your dose of toujeo**

What to do when you are sick

An illness, like a fever, infection or flu, can cause your blood sugar to be high. This can put you at risk for dehydration. You may need to adjust your eating patterns or take extra insulin to manage your blood sugar when you are sick.

- Check your blood sugar every 4 hours. Keep a record.
- Keep taking your diabetes oral medications (only type 2 diabetes patients), unless your doctor tells you to stop.
- Take your insulin. More insulin may be needed if your blood sugar is really high. You may need less insulin if you are vomiting or have diarrhea.
- Try to eat your usual amount of carbohydrate. If you have nausea or difficulty eating, try to have **15 grams of carbohydrate every hour**.
- Drink extra water and caffeine-free fluids to avoid dehydration. Drink **1 cup (250 mL) of fluid every hour** you are awake.

15 grams of Carbohydrate Snacks		
Starchy Foods	Fruits & Vegetables	Other Foods
6 soda crackers 1 slice bread ¾ cup corn flakes ½ cup cooked oatmeal	¾ cup fruit juice 1 cup tomato juice ½ cup apple sauce	½ cup regular Jell-O ¾ cup regular pop ½ cup Gatorade 1 popsicle (single) 1 cup milk

Caffeine-Free Fluids		
Decaf tea or coffee	Diet pop or diet Jell-O	Crystal Light
Clear broth	Water	Soda water

- **Get medical help if you are vomiting 2 or more times in 12 hours.**
- **If you are not able to eat or drink anything in 4 hours**
- **If you are not able to keep anything down without vomiting and or a lot of diarrhea**

Physical activity and diabetes

Physical activity is an important part of a healthy lifestyle and managing type 2 diabetes. Exercise can help maintain good blood sugar levels, a healthy weight and promote heart health.



It is important to:

- **Talk to your diabetes team or family doctor before starting a physical activity program**
- **Monitor your blood sugar before and after physical activity**

If you are using insulin, physical activity may increase the chance of having hypoglycemia (low blood sugar).

Tips for preventing hypoglycemia during exercise

Plan ahead:

- Bring a carbohydrate snack in case your blood sugar drops during or after your activity
- Bring enough water to stay hydrated
- Bring treatment for hypoglycemia (such as: juice or candies)
- Carry personal and wear diabetes identification (such as: MedicAlert®)

For planned activity:

- Consider decreasing your meal rapid insulin dose prior to the activity by 1 or 2 units (or 20 to 50%) especially if you are exercising 1 or 2 hours after a meal. Intensity, type and length of time doing the activity should be considered when decreasing your meal rapid insulin dose.
- You may also decide to have a carbohydrate containing snack before the activity to prevent hypoglycemia

For any unplanned activity: Eat a snack (15-20 grams of carbohydrate) before you exercise.

Driving safely while on insulin

Before driving

Test your blood sugar. If your blood sugar is:

Less than 4.0: **DO NOT DRIVE** - treat hypoglycemia (Page 17 and 18)
After successfully treating your hypoglycemia, wait 45 minutes and then recheck your blood sugar.

Only drive if your blood sugar is above 5.0

Between 4.0 - 5.0: Have a snack containing carbohydrate before driving.

While driving

- Test your blood sugar every 4 hours during long drives.
- If you feel symptoms of low blood sugar, pull over immediately and test.
- Follow the instructions for treating hypoglycemia.

Tips for driving safely

- Always keep a source of sugar within reach (or in the glove compartment) while driving.
- Always pack your blood sugar meter, hypoglycemia treatment, snack and other supplies.
- If you have severe hypoglycemia that you cannot treat alone, you must tell your doctor right away. Do not drive until your doctor tells you it is okay.
- If you get hypoglycemia often or have hypoglycemia unawareness (unable to feel a low blood sugar), talk to your doctor.



Always check your blood sugar before driving
Remember: “five to drive”

Alcohol and diabetes

For people with diabetes, there is a risk that hypoglycemia can happen up to 24 hours after drinking alcohol.

- Use Canada's Low-Risk Alcohol Drinking Guidelines:

For women: limit alcohol to 2 drinks per day or less than 10 drinks per week

For men: limit alcohol to 3 drinks per day for men or 15 drinks per week

- It is important to drink alcohol with a meal, or have a carbohydrate snack with alcohol.

If you plan to drink alcohol, consider the following:

- If you are counting carbohydrate, **do not** include alcohol in your carbohydrate calculations.
- Eat regular meals that include a source of carbohydrate, take your medicines and check your blood sugar level before, during and after drinking.
- Bring treatment for low blood sugar with you as well as a snack to have after drinking.
- Check your blood sugar before bed. If your blood sugar is between 4.0 and 10.0, have a carbohydrate snack to prevent your blood sugar from going too low overnight.
- Get up on time the next day. Test your blood sugar, eat regular meals and take your normal medicines. Take a nap later in the day if needed.
- Consider decreasing your rapid acting insulin the morning after drinking alcohol if your morning blood sugar is lower than usual for you.



Unused or expired medicine

Many medicines, including insulin, are used to treat diabetes. **Expired medicines are dangerous to use.** The Ontario Medications Return Program safely disposes of all unused or expired medicines.

- DO NOT put medicines in the garbage or down the drain/toilet.
- Keep medicines in their original packages, but remove your name or any other personal information.
- Bring your medicines to a participating pharmacy to properly dispose of them.

For more information visit www.healthsteward.ca.



The poster features the MRMP logo (Medications Return Program) at the top. Below the logo, there are two columns: 'YES' (white background) and 'NO' (yellow background). The 'YES' column lists items that are accepted for return, and the 'NO' column lists items that are not. At the bottom, there is a note about loose pills and blister packs.

YES	NO
<ul style="list-style-type: none">✓ All prescription drugs✓ OTC Medications (pills/liquids)✓ Natural Health Products in oral dosage form✓ Anti-fungal creams✓ Anti-bacterial creams✓ Inhalers✓ Patches	<ul style="list-style-type: none">Sharps, syringes or needlesShampoosMouthwashAntiperspirantsAntisepticsPharmaceuticals from farms/ hospitalsPharmacy waste produced by the pharmacyExpired samples from doctor's office

Loose pills, blister packs, etc
No free liquids

Sharps disposal

Sharps are the lancets (needles to poke finger) and the pen needles. **Do not put sharps in the garbage or flush down the toilet.** The Ontario Sharps Collection Program will safely dispose of used sharps for free. Most pharmacies participate in this program.

- Ask your pharmacist for a **free** yellow sharps approved container for your used sharps.
- **Do not** bend, clip, break or recap sharps.
- **Do not** fill container beyond the fill line.
- Store container in a safe place out of reach of children.
- When the container is full bring it to a participating pharmacy to dispose of and get a new container.

For more information visit www.healthsteward.ca.



**Free Yellow Sharps
Approved Container**

Contact information

Registered nurse (RN) contact information:

Registered dietitian (RD) contact information:

Social worker contact information:

To make or change your appointment time and date:

Please call 426-867-3679 or 416-867-7424

Bring these items to your appointments:

- Your meter
- Your logbook or uploads
- Your diet records (if you are seeing the dietitian)
- A list of your current medicines when you come for your appointments

Other resources (videos)

Watch a series of videos on using insulin

<http://shorturl.at/gwGX3>



St. Michael's cares about your health. For reliable health information, visit our Patient and Family Learning Centre, Room 6-004, 6th floor, Cardinal Carter Wing, or find us online at www.stmichaelshospital.com/learn

This information is not intended as a substitute for professional medical care. Ask your healthcare provider about this information if you have questions.

St. Michael's

Inspired Care.
Inspiring Science.

30 Bond Street, Toronto, ON M5B 1W8 Canada
416.864.6060 stmichaelshospital.com