UZ LEUVEN

Diabetes practical guide: insulin analogues

patient information

Introduction

Diabetes mellitus or diabetes is a chronic condition, for which there is as yet no cure available. At this point in time it is estimated that approximately 366 million people are suffering from diabetes worldwide. And this number is expected to continue to increase to 438 million by 2030. It is thought that 7.8% of the global population will be suffering from diabetes by 2030.

The statistics currently available for Belgium are limited and incomplete. It is estimated that together type 1 and type 2 diabetes occurs in 8% of the adult population in Belgium. Current predictions indicate that by 2030 this will rise to 9.6% or one in ten adults in Belgium. This data comprises known and unknown cases of diabetes (not everyone is aware that they are suffering from diabetes).

Diabetes is characterised by excessively high blood sugar levels. Healthy blood sugar levels can only be maintained providing you have a clear insight into your diabetes treatment. This brochure aims to help you along the way. If you have further questions please do not hesitate to talk to your doctor, diabetes nurse or diabetes dietician.

The Diabetes Team

WHAT IS DIABETES MELLITUS?

Our body uses carbohydrates or sugars derived from food as fuel. Sugar is, therefore, a source of energy for the body. To release energy the cells in our body need to 'burn' these sugars. Insulin ensures that the sugar or glucose is transported to the cells. Insulin is a hormone secreted by the beta cells in the pancreas (a gland located in the upper abdomen).

If you suffer from diabetes your body is producing insufficient or no insulin, or the insulin that's being secreted is not effective enough. In both cases the cells will not be able to absorb sufficient sugars (glucose) so that sugar is not used as a source of energy.
You will become aware of this because the sugar levels in your blood will rise and you will start to feel tired and listless (lack of energy). Treatment will involve daily subcutaneous insulin injections and measuring of your blood sugar levels.

YOUR TREATMENT: INSULIN ANALOGUES

Insulin analogues are the latest generation of insulin. They are sometimes referred to as ultra-long acting and ultra-fast acting insulin.

ULTRA-LONG ACTING INSULIN

Brand name .....

Starts to work 1 to 2 hours after an injection

Stops working After approx. 24 or 48 hours

When should it be injected?

Ultra-long acting insulin has to be injected at set times. You can determine when but it must be injected at the same time each day. It is advisable to choose a time in the evening, e.g. with your evening meal or before going to bed.

ULTRA-FAST ACTING INSULIN

Fiasp®

Starts to work 5 minutes after an injection

Stops working After approx. 2 to 3 hours

Wanneer inspuiten?

Fiasp® needs to be injected just before a meal. If you are skipping a meal (e.g. no breakfast) you should not inject ultra-fast acting insulin. If you are having an additional meal, you should also inject an extra dose of ultra-fast acting insulin.

Other types of ultra-fast acting insulin

Brand name .....

Starts to work 10 minutes after an injection

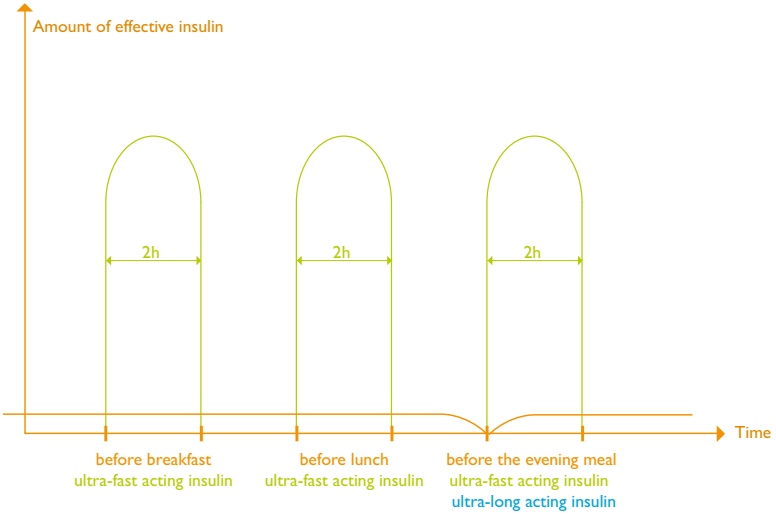
Stops working After approx. 2 to 3 hours

When should you inject?

Ultra-fast acting insulin needs to be injected approximately ten minutes before each meal. If you are skipping a meal (e.g. no breakfast) you should not inject ultra-fast acting insulin. If you are having an additional meal, you should also inject an extra dose of ultra-fast acting insulin.

DAY OVERVIEW:

Before breakfast:	ultra-fast acting insulin
Before lunch:	ultra-fast acting insulin
Before the evening meal:	ultra-fast acting insulin
Fixed time:	ultra-long acting insulin



HOW MUCH INSULIN DO YOU NEED TO INJECT?

You will have to calculate the amount of ultra-fast acting insulin you need to inject before each meal yourself.

- First you need to measure your blood glucose level.
- Always start with the basic amount of insulin prescribed by your doctor. Depending on your blood glucose level, you will have to add or subtract a number of units to/from the prescribed basic amount of insulin.
- Use the following schedule to make the calculation.

Blood level between :

0 and 60:	- 2 U
60 and 80:	- 1 U
80 and 150:	basis
150 and 200:	+ 1 U
200 and 300:	+ 2 U
300 and 400:	+ 3 U
400 and 500:	+ 4 U

U = unit

The amount of ultra-long acting insulin will always be the same, i.e. it will not need to be adapted on the basis of the above schedule.

EXAMPLE INSULIN BASIC SCHEDULE (= DOCTOR'S PRESCRIPTION)

Before breakfast:	14 U ultra-fast acting insulin
Before lunch:	12 U ultra-fast acting insulin
Before an evening meal:	16 U ultra-fast acting insulin
Fixed time:	18 U ultra-long acting insulin

Calculation of ultra-fast acting insulin dose on the basis of blood sugar levels

Before breakfast:	125 mg/dl > basis = 14 U
Before lunch:	208 mg/dl > basis = 12 U + 2 U (schedule) = 14 U to inject
Before an evening meal:	68 mg/dl > basis = 16 U - 1 U (schedule) = 15 U to inject
Fixed time:	276 mg/dl > 18 U

U = unit

HOW TO INJECT INSULIN WITH THE INSULIN PEN

The diabetes nurse will provide you with two insulin pens: one for ultra-fast acting insulin and one for ultra-long acting insulin. Although the pens may be used for different purposes, the injection principle is always the same:

1. Check that the pen is releasing insulin: dial up two units and and expel this test shot over your hand. If no insulin droplets appear, dial up and expel two units again. Keep repeating this process until droplets of insulin appear.
2. Dial up the dose (amount) of insulin you need to inject.
3. Insert the needle vertically into the skin, if necessary into a skin fold as instructed by the diabetes nurse.
4. Inject the insulin.
5. Wait for ten seconds.
6. Remove the needle. If you are injecting into a skin fold: first release the fold slowly and then remove the needle.

WHERE SHOULD YOU INJECT?

Always inject ultra-fast acting insulin into your abdomen (across the entire abdominal area) and ultra-long acting insulin into the upper leg (on both legs).

Remember not to inject in exactly the same spot each time. Otherwise there is a risk of developing lipodystrophy. An area affected by lipodystrophy will not absorb insulin consistently, which increases the risk of excessive fluctuations in your blood sugar levels.

REPLACING THE NEEDLE

The needle on your insulin pen should be replaced daily. Insert a new needle in the pen containing ultra-fast acting insulin every morning. Once you have administered the last ultra-fast acting insulin injection (with the evening meal) switch the needle to the pen containing ultra-long acting insulin. Discard the needle after injecting the ultra-long acting insulin. Do not dispose of needles in a bin bag but use an approved needle container. When it is full to the maximum line, seal the container with the cover provided with it and take it to the local refuse/recycling centre. Used needles are actually classed as small hazardous waste. Approved needle containers can be purchased from pharmacies, medical wholesalers or the Diabetes Liga. A number of cities and communities provide the containers free of charge. It is advisable to always check this out.

You need to buy the needles yourself from a pharmacy, the Diabetes Liga or a medical equipment/consumables supplier. A box containing 100 needles costs approximately 20 euro, the standard length varies between 4 and 6 mm.

STORING INSULIN

Spare insulin (pens) is best stored in the vegetable drawer in the fridge. Used insulin pens should be stored at room temperature.

MEASURING YOUR BLOOD SUGAR LEVELS

WHY DO YOU NEED TO MEASURE YOUR BLOOD SUGAR LEVELS?

The treatment uses medication to try and reach normal blood sugar levels. A normal blood sugar level relates to a value between 80 and 150 mg/dl. You need to measure your blood sugar level yourself before each meal. This will tell you immediately whether your blood sugar level is under control. It will also enable you to calculate the correct amount of insulin. You must also measure your blood sugar level before you go to bed.

WHEN AND HOW OFTEN SHOULD YOU MEASURE?

Measure your blood sugar levels four times a day: before every meal and before going to bed. Even if you inject ultra-long acting insulin during the day, you should measure your blood sugar level before going to bed.
One day each month also systematically measure your blood sugar levels two hours after each meal. This will enable you to reassess the basic quantities of ultra-fast acting insulin.

Make a note of each blood sugar level in your diabetes diary and always include the amount of insulin you have injected.

HOW TO MEASURE YOUR BLOOD SUGAR LEVEL?

1. Wash your hands.
2. Insert the strip into the measuring device.
   If your device requires a code check the code number.
3. Prepare the injection pen and replace the needle daily (in the morning). Tighten the spring.
4. Place the pen at the side of the top of your finger.
5. Prick your finger and squeeze out a drop of blood. Always squeeze from the bottom to the top of your finger.
6. Once you have a sizeable drop of blood soak it into the strip on the device.
7. Wait a few seconds and check the result.
8. Record the result in your diabetes diary.

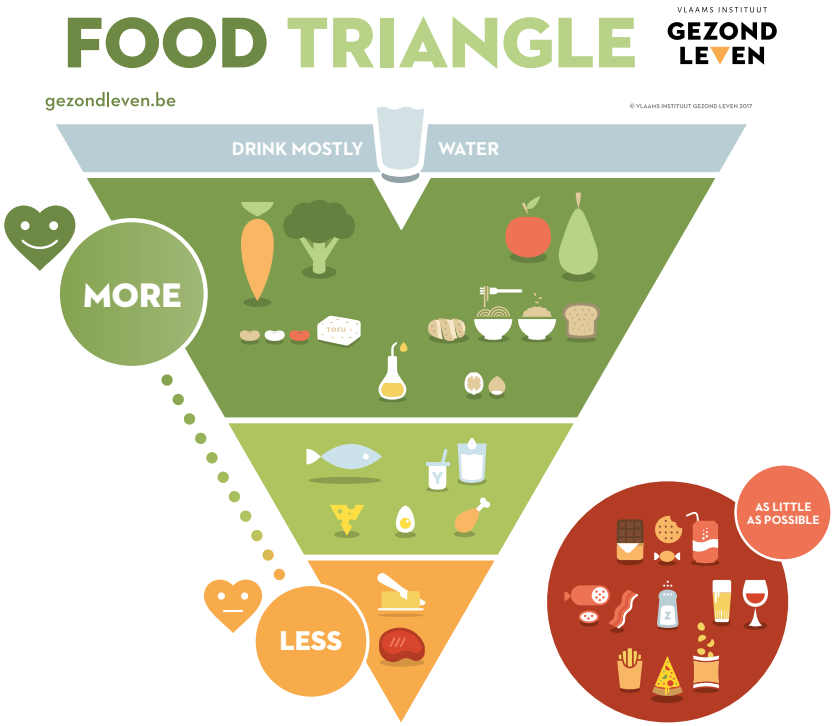
NEW MEASURING TECHNIQUES

New measuring techniques are also available from our convention centre. Examples include flash glucose monitoring and continuous glucose monitoring. These techniques are only refunded for type 1 diabetes.

Consult your diabetes nurse for advice.

NUTRITION

Balanced nutrition represents a significant part of any diabetes treatment. It is based on the food triangle, which is divided into different sections. Each section has a colour, ranging from red to orange and green. The colour of a section reflects the impact that foods from that section have on our health. To create a balanced diet, preference should be given to foods from the green groups. Foods from the red group are best avoided.



People who suffer from diabetes need to avoid carbohydrates. It is important to be aware of which foods contain carbohydrates. Examples include:

- Grain products and potatoes
- Fruit
- Pulses (beans, lentils and chickpeas)
- Some vegetables (parsnip, sweet corn, beetroot, etc.)
- Dairy produce (except cheese) and plant based soy drinks
- Plant based drinks made from grains, nuts and seeds
- Deep fried snacks, crisps, cake, patisserie, chocolate, biscuits, sweets, ice cream, sweet sandwich fillers, soft drinks, some alcoholic drinks, etc.

A BALANCED DIABETES DIET BASED ON THE FOOD PYRAMID

WATER

Water or moisture is a vital component in the body. The body's moisture level must remain balanced every day. Under normal circumstances the body requires a minimum of 1.5 litres of moisture. Drink water whenever possible. Unsweetened coffee or tea are a good alternative. Drinks containing less than five kcal do not affect blood sugar levels. Fruit and vegetable juices, alcoholic drinks, sweetened soft drinks and sports drinks do have an impact on blood sugar levels.

DARK GREEN

These foods have a beneficial impact on your health. Try to choose non processed options whenever possible as they have a beneficial impact on your blood sugar levels.

- Fruit: all types of fresh fruit are healthy. No fruits are taboo for people suffering from diabetes. Some types of fruit contain more carbohydrates though and you should consequently adjust their portion size. Fruit is an important source of vitamins, minerals and soluble dietary fibre.
- Vegetables: opt for a large portion of vegetables with sandwich based and hot meals. Soup is also highly recommended. Most vegetables contain few carbohydrates but supply mainly soluble dietary fibre, vitamins and minerals.
- Whole grains and potatoes: choose whole-wheat (fibre rich) grain products such as whole-wheat pasta, brown rice and brown/wholemeal bread types. Grains and potatoes are an important source of carbohydrates in the form of starch. Adapt the quantity to your personal daily routine.
- Pulses and meat substitutes: pulses offer many benefits. It is advisable to eat them at least once a week. Pulses provide carbohydrates but they lead to a slow rise in blood sugar levels and they have a satisfying effect. Because pulses contain carbohydrates it is best to reduce other sources of carbohydrates (such as potatoes, rice, bread etc.). Pulses are excellent meat substitutes. Other meat substitute options include tofu, tempé, seitan and quorn. Choose varieties that have not been deep fried.

- Nuts: a handful of nuts every day is healthy. Nuts are a fatty and high energy food so it's best to keep it to a handful a day.
- Oils and fats: opt for vegetable oils but avoid palm and coconut oil. You could also opt for liquid margarine. Use one tablespoon of fat with a hot meal. Apply just a pinch of butter/margarine type spread to each slice of bread (spreadable and available in tubs).

LIGHT GREEN

- Fish: eat fish once a week. Include both oily and non-oily types of fish.
- Dairy products: dairy products naturally contain carbohydrates in the form of lactose. Choose product types without added sugar such as (butter)milk and yoghurt sweetened with low calorie sweeteners. Soy based drinks (natural) enriched with calcium are also good.
- Cheese: cheese does not usually contain carbohydrates but is a source of saturated fats. Opt for low fat varieties.
- Eggs: eggs are part of a healthy diet. Eggs are an excellent meat substitute and do not contain carbohydrates.
- Poultry: opt for white meat (chicken and other poultry) instead of red meat (four-legged animals) and fresh rather than processed. Opt for low fat types of meat if possible.

ORANGE

Limit the use of butter, low fat butter, coconut and palm oil, hard margarines and red meat.

RED (these foods are not included in the food pyramid)

Foods in the red group include highly processed products with a lot of added sugar, fat and/or salt.
They should be avoided. This also applies to chocolate, biscuits or cake without added sugars and alcohol free drinks containing a lot of sugar (soft drinks, fruit juice, etc.).

RELATIONSHIP BETWEEN CARBOHYDRATES AND INSULIN

Ultra-fast acting insulin should be injected ten minutes before a meal. The amount of insulin is tailored to the amount of carbohydrates you consume. If you constantly inject the same dose, the amount of carbohydrates consumed during each meal must also remain the same. If you constantly inject the same amount but eat more carbohydrates than normal, you will notice that your blood sugar levels rise. If you eat fewer carbohydrates your blood sugar level may become too low.

It is important to eat at regular intervals. Have three main meals each day and supplement them, if necessary, with two to three snacks a day. Your ultra-fast acting insulin will no longer be effective if you eat a snack, which is why it is advisable to opt for low carbohydrate snacks such as clear soup, raw vegetables, a low fat unsweetened dairy product or handful of olives or unprocessed nuts.
Consult your dietician for advice.

TIPS FOR A HEALTHY LIFESTYLE

- ✗ Water is the most important drink. Drink enough even if you're not thirsty.
- ✗ Eat more vegetable than animal based foods.
- ✗ Opt for foods that have undergone minimal or no processing.
- ✗ Avoid highly processed products.
- ✗ Eat a varied diet to prevent it from becoming monotonous and imbalanced.
- ✗ Eat at regular intervals. Have three main meals and three snacks, if necessary, each day.
- ✗ Limit the use of salt.
- ✗ Take sufficient exercise, referring to the physical activity triangle below.

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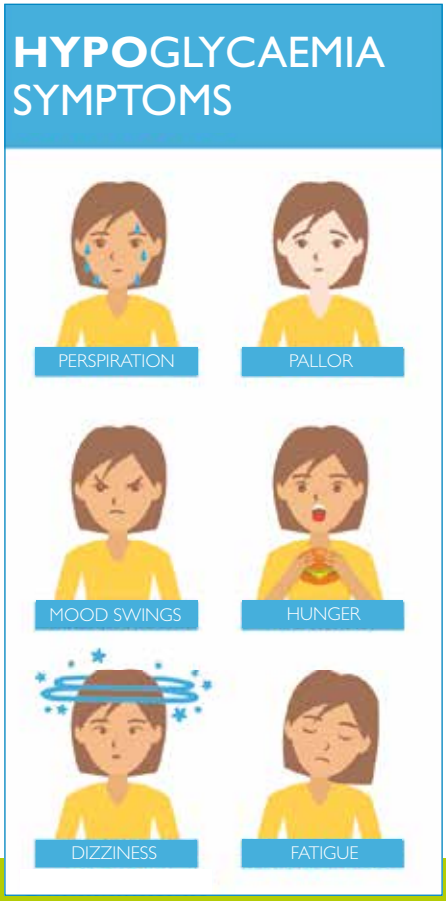
Please consult the dieticians for further information concerning a healthy diet and healthy snacks.

They can be contacted on working days between 0 9.00 and 16.00 hrs on 016 34 10 86.

WHAT IF YOUR BLOOD SUGAR LEVEL IS TOO LOW?

Low blood sugar is also referred to as hypoglycaemia or hypo for short. It refers to a blood sugar level below 60 mg/dl. A hypo will make you feel uncomfortable. Potential symptoms include: shaking, perspiring, dizziness, hunger, poor vision, headache, pallor, etc.



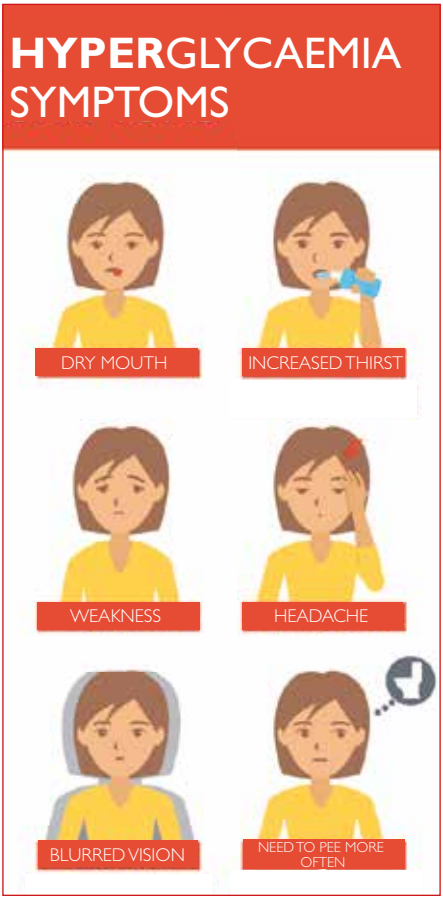
1. React immediately, don't wait, if you think you are having a hypo.
2. If you feel unwell check your blood sugar level immediately if possible.
3. If your blood sugar level is below 60 mg/dl you need to consume rapid acting sugars immediately:
   ✔ Consume 10 g of dextrose (three to four tablets).
   ✔ Drink a glass of water.
4. Wait ten to fifteen minutes.
5. Make a note of the hypo and the time it happened in your diabetes diary.

Concentrate when using a flash system meter or sensors:

- Always check with a finger prick
- If the values are low or close (below 100 mg/dl) with the arrow pointing downwards: always react the same as with a hypo (consume rapid acting sugars)
- In the event of low or close values with the arrow pointing upwards:
  - ✔ With hypo symptoms: react the same as with a hypo (consume rapid acting sugars)
  - ✔ No hypo symptoms: do not take action

WHAT IF YOUR BLOOD SUGAR LEVEL IS TOO HIGH?

A one-off high blood sugar level (= hyperglycaemia) is no reason to panic.
If your blood sugar values consistently remain above 200 mg/dl, contact the diabetes nurse on 016 34 34 75.



WHERE CAN YOU OBTAIN MATERIALS?

If you need insulin injections four times a day and regularly need to measure your blood sugar levels yourself, you will qualify for a refund of any materials that you need. Refunds can be applied for in this hospital or a hospital nearer to your home that is a member of the diabetes convention. Consult your diabetes nurse for details. The application will be processed by the diabetes nursing staff when insulin injections are initiated and will have to be repeated annually. The diabetes nursing staff will also deal with this.

To ensure that your refunds continue you need to:

- regularly attend a hospital consultation (every four months);
- bring a report from your ophthalmologist to a consultation once a year;
- monitor your urine for 24 hours and bring a sample to the consultation at least once a year.

You will be provided with sufficient materials for four months during each consultation. Ensure that a new appointment is made there and then. If your insulin pen or measuring device is faulty contact the diabetes nursing staff first.

WHERE CAN YOU COLLECT YOUR MATERIALS?

Glucose measurement material	Collection point	Insulin injection material	Collection point
Measuring device	Diabetes team	Insulin pen(s)	Diabetes team
Strips	Diabetes team	Insulin	Pharmacy, with doctor's prescription
Pen (finger prick)	Diabetes team	Pre-filled insulin pens	Pharmacy, with doctor's prescription
Pen needles	Diabetes team	Insulin pen needles	You must buy yourself (pharmacy, Diabetes Liga or equipment/ consumables supplier)
Batteries measuring device	You must buy yourself	Diabetes diary	Diabetes team
		Needle containers	Pharmacy, Diabetes Liga, surgical material suppliers, etc.

WHAT SHOULD YOU BRING TO A CONSULTATION?

- ✔ Diabetes diary!
- ✔ Measuring device
- ✔ Insulin pens
- ✔ A list of the medication you are taking

IMPORTANCE OF YOUR DIABETES TREATMENT

The aim of correct blood sugar management is to prevent long term diabetes complications. If you manage your blood sugar levels correctly the risk of complications is small. Complications can be categorised into three groups:

- Blood vessel disorders (heart, eyes, kidneys, legs, brain)
- Nervous system disorders
- Infections and foot problems

FOOT PROBLEMS

Foot problems usually occur as a result of a combination of symptoms: circulation problems, reduced sensitivity as a result of problems involving the nerve system and slower wound healing because of higher blood sugar levels. If you develop a small wound on your foot, you may not be aware of it immediately because it is less or not at all painful. The wound will also heal more slowly. Prevention is always better than cure and you can do this by taking a number of simple measures.

PREVENTION IS BETTER THAN CURE

❶ Wash your feet daily

- Limit foot baths to five minutes to prevent weakening of the skin.
- Limit the water temperature to 37°C.
- Dry your feet properly, including between the toes.
- Apply a moisturising cream daily but avoid the area between the toes.

Wash your feet daily.

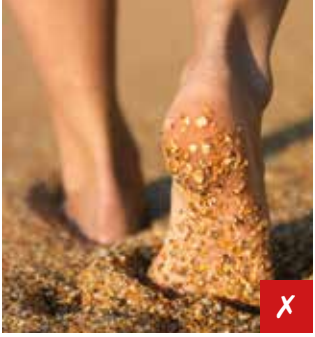
❷ Foot care

- Have your nails cared for regularly by a pedicure or podiatrist.
- Do not use metal nail clippers or nail files. You can use hard cardboard files if necessary.
- Cut your toenails straight across and sticking out just above the edge of the toe.
- Do not use potent ointments or plasters to remove corns or calluses.
- Check your foot soles and the area between the toes for wounds daily.
- Never walk around barefoot, not even at home.

Do not use metal nail clippers or nail files.

Cut your toenails straight across.

Check your feet for wounds every day.



Never walk around barefoot.

❸ Think about socks and shoes

- Change socks daily.
- Always wear woollen or cotton socks.
- Don't wear socks or shoes that are too tight.
- Wear soft top socks.
- Don't wear socks with holes or signs of wear and tear.

Don't wear socks or shoes that are too tight.

Don't wear socks with signs of wear and tear.

❹ Warm up cold feet correctly

- Avoid burns as a result of using a hot water bottle or cherry stone pillow.
- Wear bed socks if necessary.

❺ Consider your sitting position.

- Sitting cross-legged will inhibit the circulation to the feet.

FURTHER INFORMATION

Have you encountered problems or do you have specific questions? If so, contact the diabetes nursing staff on 016 34 34 75.

You can also contact our diabetes nursing staff at the consultation unit:

- Monday to Friday between 09.00 and 17.00 hrs.
- via e-mail: diabeteseducatoren@uzleuven.be

In the event of diet related questions and/or problems you can contact the diabetes dieticians on working days between 09.00 and 16.00 hrs on 016 34 10 86.

Design and realisation
This text has been drawn up by the diabetes team in cooperation with the communications team.

You can also find this brochure on www.uzleuven.be/en/brochure/700049.

If you have any comments or suggestions regarding this brochure, please send them to communicatie@uzleuven.be.

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