

# Type 1 diabetes in adults: diagnosis and management

Information for the public

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## Type 1 diabetes in adults: the care you should expect

Type 1 diabetes causes people to have too much sugar (glucose) in their blood. It is caused when the body cannot make enough of a hormone called insulin, which controls how much sugar is in the blood.

Type 1 diabetes puts people at risk of long-term problems with their blood vessels (for example, stroke), eyes, feet, heart, kidneys and nerves. It is a life-long condition that affects everyday life. People with type 1 diabetes will need:

- to have a healthy lifestyle (which may mean changing their diet)
- to take insulin to control their blood sugar level
- regular check-ups.

We want this guideline to make a difference to people with type 1 diabetes by making sure:

- they get the correct diagnosis
- they get all help they need to manage their diabetes, including insulin, education, and advice on diet and exercise
- they get regular checks for long-term problems, and treatment if they need it
- they are encouraged to see a dentist regularly, to get checked for gum disease
- they are involved in decisions about their care, such as choosing an average blood sugar target (called a HbA1c level) – the target is usually 48 mmol/mol (or 6.5%), but for some people, a different target can be better
- they are offered a choice of continuous glucose monitoring or flash devices to help them regularly check their blood sugar levels
- they are taught how to stop their blood sugar levels from getting too high (hyperglycaemia, or a hyper) or too low (hypoglycaemia, or a hypo), and how to manage hypers and hypos when they happen
- they know what to do if their diabetes gets out of control and they think they have diabetic ketoacidosis (a serious illness that needs to be treated in hospital).

## Making decisions together

Decisions about treatment and care are best when they are made together. Your health and care professionals should give you clear information, talk with you about your options and listen carefully to your views and concerns.

To help you make decisions, think about:

- what matters most to you – what do you want to get out of any treatment or care?
- what are you most worried about – are there risks or downsides to the treatment that worry you more than others?
- how will the treatment affect your day-to-day life?
- what happens if you do not want to have treatment?

If you need more support to understand the information you are given, tell your healthcare professional.

Read more about [making decisions about your care](#).

## Diagnosing type 1 diabetes

If your doctor thinks you might have type 1 diabetes, they will ask you about your symptoms. You should have urine and blood tests to check for 'markers' of diabetes – for example, glucose and [ketones](#).

## Your diabetes care team

You will have a diabetes care team of people who are experts in diabetes (which may be called a 'multidisciplinary team'). It will include doctors, nurses and other professionals, such as people who can give you advice about your diet or about looking after your feet. You will generally see your care team at a diabetes clinic (usually at a hospital), but you may have some checks at other places. Your GP will also be involved in your care.

Your diabetes care team will support you to manage your diabetes yourself. If you are worried about your diabetes or any of your symptoms, you should be able to get advice at any time. This could be from a member of your care team in person or by phone during the day. You should be given details of a 24-hour helpline staffed by people who are experts in diabetes.

Some treatments or care described in this information may not be suitable for you. If you think that your treatment does not match this advice, talk to your diabetes care team.

## Planning your early care

It is important to start treating type 1 diabetes straight away. You may need to go to a specialist centre for this.

Your diabetes care team will work with you to agree a plan for your care as soon as you are

diagnosed (or as soon as you are well enough, if you need urgent treatment). This is known as your early care plan.

Your care team will ask you about your medical history and general health, your lifestyle and home life, and any family history of diabetes or heart problems. You will also have a general health check, which includes looking for possible risk factors for cardiovascular disease, because these can be treated to lower your risk. Your eyes and feet will be checked.

Your care team should give you information about treatments for diabetes, including:

- how to inject insulin
- different types of insulin treatment
- how to check your blood glucose
- how to recognise and avoid or manage hypos (hypoglycaemia – low blood sugar levels).

Your care team should ask you about any cultural preferences, because this may affect the type of treatment you choose.

Your family members or carers should also be given information, if you agree, and you may want to involve them in agreeing your early care plan and in other decisions about treatment and care.

Once your early care plan has been agreed, you will have the chance to look at it again with your care team during the first few weeks, to see how it is working and to make any changes that are needed.

## What your diabetes care team will do

Your diabetes care team will help and support you to manage your diabetes, including your insulin treatment. You will need to go to the diabetes clinic (usually at the hospital) or be in contact with your care team regularly – for example, by phone or email.

You will also have a thorough check-up every year – your 'annual review'. This involves several checks that may happen at different times and in different places.

Your diabetes care team will work closely with you, and you can ask for help or advice at any time. What the team does will depend on how long you have had diabetes for and how well managed it is, but should include:

- discussing your insulin treatment, and reviewing with you how you take it
- discussing checking your blood glucose, reviewing with you how you do it and agreeing targets with you
- testing your HbA1c levels (which reflect your average blood glucose level over the last 2 to 3 months) at least every 3 to 6 months, and agreeing targets with you
- explaining about the symptoms, risks and treatment of hypos
- giving you advice and support about your type 1 diabetes, including details about support groups
- offering you a course that helps you to learn more about type 1 diabetes, including working out how the foods you eat affect your blood glucose and how to adjust your insulin to match
- looking at whether you have cardiovascular disease and your risk of getting it in future
- making sure you have regular eye screening
- making sure you have regular foot checks (as part of your annual review)
- encouraging you to see a dentist regularly, so they can check for gum disease
- checking for other long-term complications that can be caused by type 1 diabetes, such as problems with your kidneys or nerves
- keeping a lookout for anxiety, depression and eating disorders (which can be more common in people with type 1 diabetes), and offering treatment and referral to specialists if needed
- checking for other conditions that are more common in people with type 1 diabetes, such as thyroid disease, coeliac disease and other autoimmune conditions.

Your care team should agree an ongoing care plan with you (which may be different from your early care plan) that suits your lifestyle and takes any cultural preferences into account. You and your care team can agree changes to this care plan if your circumstances or wishes change.

If it is possible that you could get pregnant, you should be given information about contraception and family planning. NICE has produced guidance and information for the public about diabetes in pregnancy.

### Questions to ask about your care

- Please tell me more about living with type 1 diabetes
- How often will I need to visit the diabetes clinic? Who will I see there?
- Where will I have to go for check-ups?
- What sorts of health problems are more common in people with type 1 diabetes? What can I do to help prevent these?
- Who should I contact if I have any questions or am worried about my diabetes?
- Can you give me written information? What websites are helpful?
- Can you point me towards any local or national support groups?

## Learning more about type 1 diabetes

By understanding your type 1 diabetes better, you will be more able to manage it successfully and reduce your risk of short-term and long-term complications. Learning about your diabetes and how to look after yourself is an essential part of diabetes care.

Between 6 months and a year after you are diagnosed, you should be offered a course to help you improve your understanding of type 1 diabetes and how to manage it in your everyday life. This course should cover:

- checking your blood glucose levels, and why you should aim to keep them as close to normal as possible
- using insulin to treat diabetes
- advice about having a healthy diet and taking exercise.

This course is usually done in a group, as this lets people share their experiences. But if you do not feel comfortable with that you may be able to have training on your own.

If for any reason you do not have the course within a year of being diagnosed with type 1 diabetes, you can still do it at a time that suits you.

You can talk to your diabetes care team about type 1 diabetes at every appointment, and they should give you information that is useful for you. At least once a year you should have the chance to discuss in detail how you are managing with your diabetes and any needs you have.

## Using insulin

All adults with type 1 diabetes need to use insulin, because their body does not make it. Insulin cannot be taken as a tablet and has to be injected.

## Which insulins?

There are several different types of insulin treatment, which vary in both the insulins used and the number of injections. You should usually be offered 2 insulins that act in different ways:

- a 'background' (also known as a 'basal' or 'long-acting') insulin that is ideally injected twice a day **and**
- a 'quick-acting' (also known as a 'bolus' or 'rapid-acting') insulin that is injected before each meal, to deal with the rise in blood glucose from eating.

A number of options are possible depending on what suits you. Your diabetes care team will talk with you about this, so that you can agree what is best for you.

Your care team should also give you clear advice about adjusting your insulin doses, in response to your blood glucose test results and also for when you are ill (sick-day rules).

Some people may be offered an insulin pump if:

- they are having problems with severe hypos **or**

- their HbA1c levels are still too high even though they have been careful to take their insulin correctly.

## Biosimilar insulins

Your care team may talk to you about changing to a 'biosimilar' version of an insulin you are taking. A biosimilar is a biological copy of an existing insulin. Biosimilar insulins are cheaper and work in exactly the same way as the original insulin. However, you do not have to switch to a biosimilar if you are happy with your current insulin. Switching is a decision that needs to be made between you and your diabetes care team.

## Metformin

If you are overweight and you want to keep your insulin dose as low as possible, you may be offered a medicine (tablet) called metformin as well as insulin.

## Injecting insulin

Insulin is commonly injected using a device called an 'insulin pen'. Your diabetes care team should help you choose the type of device and needles that suit you, and offer you different needles to try if your skin gets sore or irritated.

Your skin can get lumpy if you keep injecting in the same place, so you should use different areas of your body (stomach, thighs, bottom, upper arms) and different spots in these areas. Your care team will check your skin at your annual review, and more often if needed.

You should be given a special secure container (called a 'sharps bin') for used needles, lancets (from finger pricking) and any other sharps. You should also be told how to get rid of these containers when they are full and how to get new ones.

### Questions to ask about insulin

- Please explain about the differences between the different insulins
- Why might I need to change my insulin dose if I'm ill?
- Can I take metformin as well as insulin?
- How often do I need to inject insulin? What are the best times to do this?
- Where should I inject?
- What different types of insulin device and needles are available?

## Checking your own blood glucose, and target levels

Having high blood glucose makes you more likely to get other health problems, so keeping your glucose levels as close to normal as possible is very important. Your diabetes care team will help you with this.

You will need to test your blood glucose every day, to make sure it does not get too high or too low – this is called self-monitoring.

If you are pregnant, when you need to test and your target levels may be different from those given below – see the [NICE guidance on diabetes in pregnancy](#).

## How to check

It's best to monitor your blood glucose all the time using [continuous glucose monitoring](#) (CGM). You can choose between real-time continuous glucose monitoring (rtCGM) and intermittent-scanning continuous blood glucose monitor (isCGM, also called 'flash'). You and your diabetes team should choose a device together, based on your preferences and needs.

If you do not want or cannot use CGM, you can monitor your blood glucose level using a simple finger prick test with a home-testing kit.

Your diabetes care team should make sure you have all the equipment you need. They should also teach you how to use the device or kit and act on the results.

## Finger prick testing: how often to test

You should test your blood glucose at least 4 times a day – before each meal and before you go to bed. You might need to test more often, such as before and during driving, when you exercise, if you start to feel unwell, during illness (as part of sick-day rules) or if you have problems with hypos.

## Target blood glucose levels

Blood glucose levels are given in a unit of measurement that is written as 'mmol/litre' or 'mmol/l'.

To minimise your risk of long-term problems caused by blood glucose levels that are higher than normal, you should aim for the following target levels:

- between 5 and 7 mmol/litre before breakfast ('fasting' level)
- between 4 and 7 mmol/litre before meals at other times of the day.

If you have to test after a meal, the target level at least 90 minutes after eating is between 5 and 9 mmol/litre.

Your diabetes care team should talk with you about your blood glucose targets. This includes what level to aim for before you go to bed, which will depend on when you last ate and your insulin dose.

### Questions to ask about testing your blood glucose

- What are my target blood glucose levels?
- How do I adjust my insulin dose to meet the targets?
- Do all of my results need to be in the target range?
- What can I do if I'm often missing my targets?

### Questions to ask about finger-prick testing

- Why do I need to test my blood glucose?
- When should I test?
- Is it OK to test after a meal rather than before?
- When might I have to test more often?

## Having your blood glucose checked: HbA1c

The HbA1c blood test reflects your average blood glucose level over the last 2 to 3 months. Keeping your HbA1c level as close to normal as possible is an important part of managing diabetes. Your diabetes care team should discuss this with you, and together you should agree a personal HbA1c target to aim for.

Your HbA1c should be tested every 3 to 6 months. It might be done more often if your blood glucose levels are changing quickly. You should be told your HbA1c result after each test.

The HbA1c result is given in a unit of measurement that is written as 'mmol/mol'. HbA1c used to be given as a percentage (%), so you may still see this.

The HbA1c target for most people with type 1 diabetes is 48 mmol/mol (or 6.5%) or lower, but your doctor might suggest a different target for you. You should be offered treatment and support to help you reach and stay at your HbA1c target.

### Questions to ask about HbA1c

- What does HbA1c show about my blood glucose?
- How, where and how often will it be tested?
- What HbA1c target should I aim for?
- What if I'm having problems meeting my target?

## Diet and exercise

### Diet

Having a healthy diet is an important part of living with type 1 diabetes. This will help you to manage your diabetes better. You should get information and advice about this from your diabetes care team as soon as you are diagnosed.

Information about checking your carbohydrate intake and matching your insulin to what you eat (sometimes called 'carb counting') should be part of your diabetes education. Advice should also cover how different meals and snacks affect your blood glucose levels, and the best times to inject insulin when eating.

An expert such as a dietitian should give you advice about your diet. This should be designed to suit your lifestyle, any other health problems you have and any cultural preferences. If you are overweight, you will be encouraged to lose weight because this will lower your risk of getting diabetes-related complications.

You do not need to follow a special diet if you have type 1 diabetes. You can still enjoy some foods containing sugar as long as they form part of a healthy balanced diet and are counted as part of your carbohydrate intake.

You can ask for advice about your diet whenever you want it – for example, about fruit and vegetables, types and amounts of fat, and other types of food and drink such as alcohol, protein, salt, fibre, sweeteners, vitamins and minerals.

## Exercise

Exercising helps you to stay healthy and reduces the risk of problems with your heart and blood vessels. If you plan to take more exercise, your diabetes care team should talk with you about what type and how much is right for you, and how exercise affects your blood glucose levels. They should also tell you how to adjust your insulin and what to eat and drink when you exercise.

### Questions to ask about diet and exercise

- Please explain more about how what I eat and drink affects my diabetes
- What sorts of foods should I eat?
- Do I have to avoid sugary foods?
- How do I adjust my insulin depending on what I eat?
- What are the effects of alcohol on my diabetes?
- How will losing weight help?
- What sorts of exercise are best? Are there any types of exercise I should avoid?
- How do I adjust my insulin if I exercise?

## Hilos

Most people with type 1 diabetes have hilos (hypoglycaemia – low blood sugar levels) quite often. Most hilos are mild, but some can be severe, which means that you need help from someone else to treat the hypo. The fewer hilos you have, the better.

If hilos become a problem for you, your diabetes care team should help you to get the best balance between reducing the number and severity of hilos while keeping your blood glucose levels as close to normal as possible.

## Managing hypos

You should always have a fast-acting type of glucose (such as glucose tablets or a sugar-containing drink) to hand for treating a hypo.

If you have a severe hypo and are unable to swallow (for example, if you are unconscious), a family member or friend can give you a glucagon injection if they have been taught how to do this.

If you are having problems with hypos, you should be given advice and support. Your doctor should look at possible causes and suggest how to improve things. This might involve reviewing how you manage your insulin, changing the types or doses of insulin you are using, or making some changes to your lifestyle.

## Recognising hypos

Most people with type 1 diabetes can tell when their blood glucose is getting too low. But some people, particularly if they have had diabetes for a long time, do not always spot the signs. This means that they are more likely to get severe hypos. Your doctor should check that you can recognise the symptoms of hypos at your annual review.

If you are having trouble recognising hypos, you should be offered training and support to help with this. Your blood glucose targets should not be changed, but you should make sure that you are not aiming for a level that is lower than the target agreed with your diabetes care team. Your insulin treatment should be reviewed, and you might be offered an insulin pump.

### Questions to ask about hypos

- Why do I have hypos?
- What can I do to avoid them?
- What are the warning signs of a hypo?
- What should I do if I have a hypo?
- I'm having trouble recognising when a hypo is starting – what can be done to help?
- I'm having a lot of problems with hypos – might an insulin pump help?

## Diabetic ketoacidosis

High blood glucose (hyperglycaemia) that is not treated can lead to a serious condition called diabetic ketoacidosis (or DKA for short). It is caused by the build-up of harmful ketones in the blood. People with type 1 diabetes are at risk of DKA.

You may be advised to test for ketones in your blood or urine as part of sick-day rules.

Your blood ketones may be measured by a healthcare professional if it is thought you might have DKA.

If you have DKA you will need emergency treatment in hospital by a specialist care team. This will include having fluids through a drip.

### Questions to ask about DKA

- What is DKA? Why might I get it?
- How will I be able to tell if I have DKA?
- When and how should I test for ketones?
- What should I do if my ketone levels are high?
- Why do I have to go to hospital if I have DKA?

## Pancreas or islet transplant

The pancreas is the part of the body that should produce insulin, and islets are the cells in the pancreas that do this.

A pancreas or islet transplant allows the body to produce its own insulin again. You may be assessed for this in a specialist centre if:

- you keep having severe hypos that do not improve with other treatments **or**
- you have had a kidney transplant and are having problems with your diabetes, particularly hypos.

## Long-term complications

Having type 1 diabetes means that you are more likely to get a number of other health problems. You can help to prevent or delay these by keeping your blood glucose levels, blood pressure and blood fat levels as normal as possible.

## Eye damage

Type 1 diabetes means you are more likely to have an eye problem called retinopathy.

Your diabetes care team should talk with you about retinopathy, and explain the problems

you might have if your eyes are affected. It is important to have regular eye screening checks for retinopathy. These are different from normal sight tests and look specifically for early signs of damage caused by diabetes.

Your eyes should be checked at or around the time you are diagnosed with type 1 diabetes and, if everything seems fine, at least once a year from then on. If there are signs that damage may be developing, you will be offered another check, or may be referred to an eye specialist at a hospital.

## Gum disease

Type 1 diabetes means you are more likely to have gum disease (also called periodontitis).

It is important to have regular dental checks for gum disease. Your dentist can do this as part of your normal dental appointments, and they will tell you how often you need to come in.

If you do get gum disease, your dentist should offer regular appointments to treat it. Treating gum disease can also make it easier to manage your blood glucose, and reduce your risk of hyperglycaemia.

## Nerve problems

### Nerve damage and pain

Type 1 diabetes means you are more likely to get nerve damage, or neuropathy.

Neuropathy can cause pain – this is called neuropathic pain.

If you have neuropathic pain you should be offered painkillers. If painkillers such as aspirin and paracetamol do not help, you should be offered stronger medicines to help with the pain. Your doctor or nurse should explain that you may need to take these for several weeks for them to have their full effect. In some cases, the pain may improve over time, so you can reduce or stop taking the medicines.

NICE has produced separate guidance and information for the public on medicines for neuropathic pain – see the NICE webpage on chronic and neuropathic pain.

## Gastroparesis

Gastroparesis is a type of nerve problem that affects the stomach. It can make you feel full and bloated even after eating a small amount of food, and can cause vomiting. High blood glucose can cause a temporary form of gastroparesis, and will make existing gastroparesis worse.

If gastroparesis is making you vomit, you should be advised to eat mashed or pureed foods. You may be offered an insulin pump as an alternative to injecting insulin, to see if this helps with symptoms.

Your doctor may also offer you medicines to help with vomiting – if so, they should explain about the possible risks and benefits of taking these medicines.

If these treatments do not help or are not suitable for you, you may be referred to a specialist.

At the time of publication, some medicines for treating gastroparesis may be recommended for 'off-label' use in this guideline. Your doctor should tell you this and explain what it means for you.

### Questions to ask about gastroparesis

- What causes gastroparesis?
- What can I do to reduce or stop vomiting?
- How might having an insulin pump help?
- Can an insulin pump be connected to my continuous glucose monitor?
- What medicines can I try? How will they help?
- What are the side effects of these medicines? What should I do if I get any side effects?

## Erection problems

Erection problems (also called 'erectile dysfunction') are quite common in men with type 1 diabetes. If you wish, your doctor or nurse should talk with you about this at your annual review. If you would like treatment you should be given medicine that can help, if this is suitable for you. If this does not work, your doctor may offer to refer you to a specialist clinic.

## Other nerve-related problems

Talk to your doctor or nurse if you have diarrhoea (particularly at night) or problems emptying your bladder fully. Also tell them if you are worried about other symptoms such as sweating a lot (especially when eating), or feeling light-headed when you change position. These symptoms may be caused by nerve problems, and you might need further tests and treatment.

## Foot problems

Type 1 diabetes increases your chances of having foot problems. NICE has produced guidance and information for the public on preventing and treating diabetic foot problems – see [other NICE guidance](#) for more information.

## Kidney disease

Having type 1 diabetes means you are more likely to get kidney disease – this is called [nephropathy](#). You should have a urine sample tested at your annual review to see if there is any albumin (a type of protein) in it. If there are signs of kidney damage you should be offered medicine for this, and advised not to eat too much protein. You may be referred to a kidney specialist (nephrologist).

NICE has produced separate [guidance and information for the public on kidney disease](#).

## Cardiovascular disease

People with type 1 diabetes are more likely to have problems with their heart or blood vessels ([cardiovascular disease](#)).

At your annual review your doctor should look out for things that may increase your risk of cardiovascular disease. If you smoke, you should be given advice about quitting.

## High blood pressure

Keeping your blood pressure as normal as possible is an important part of treatment for people with type 1 diabetes, because this reduces your risk of cardiovascular disease.

Your diabetes care team should:

- explain how changes to your lifestyle can lower your blood pressure
- offer you medicines to help lower it if needed
- tell you about the benefits and risks of the medicines
- check how well the medicines are working and ask you whether you are bothered by side effects.

### Questions to ask about treatment for high blood pressure

- Why is it important to keep my blood pressure as normal as possible?
- What blood pressure levels should I aim for?
- How often will my blood pressure be tested?
- What can I do to lower my blood pressure? Will taking exercise help?
- Why are you offering this medicine for blood pressure? How will it help?
- What are the side effects of these medicines? What should I do if I get any side effects?

## Care when you are in hospital

If you go into hospital because you are ill or need an operation, your expertise and knowledge of managing your diabetes should be respected and followed. If possible, you should be involved in food choices, monitoring your blood glucose and any changes to

your insulin treatment.

If you can eat, you should be able to carry on with insulin injections (or an insulin pump if you use one). You should be able to inject the insulin yourself if you want to and can do so safely. The number of injections and the doses and types of insulin may change to take account of your illness and any changes in food intake.

You will need intravenous insulin (through a drip) if:

- you are unable to eat, or are likely to miss more than 1 meal **or**
- you are having treatment or surgery that will make your blood glucose levels unpredictable **or**
- your illness means you are less able to absorb insulin.

## Terms explained

### Autoimmune condition

A condition where your immune system (the body's defence against infection and disease) starts to attack healthy tissues and organs. In type 1 diabetes the healthy cells of the pancreas that normally make insulin are destroyed. A person who has type 1 diabetes may also have an increased risk of other autoimmune conditions.

### Cardiovascular disease

A general term for disease of the heart and blood vessels. It is usually caused by a narrowing of the blood vessels so that blood cannot flow to the heart, brain, feet or other parts of the body properly. Heart disease and stroke are common forms of severe cardiovascular disease.

### Continuous glucose monitoring

This includes real-time continuous glucose monitoring (rtCGM) and intermittent-scanning continuous blood glucose monitor (isCGM, also called 'flash'). Both types of continuous glucose monitor work with a sensor that you wear on your skin, and a display monitor or

smartphone that shows your blood glucose level. rtCGM devices automatically send regular readings to the monitor or smartphone. You need to scan isCGM devices yourself.

## Glucagon

A hormone that raises blood glucose levels. It can be given as an injection in emergencies to people with diabetes who have severe hypos.

## HbA1c test

A blood test that reflects the average blood glucose level over the previous 2 to 3 months. The result is usually given in mmol/mol (it used to be given as a percentage). In people without diabetes, it is usually below 42 mmol/mol (or 6%).

## Hyperglycaemia

A higher than normal level of glucose in the blood. Symptoms include feeling thirsty and hungry, and increased urination. If it is not treated, hyperglycaemia can be associated with diabetic ketoacidosis, which happens when the lack of insulin becomes severe. Over time, hyperglycaemia also increases the risk of eye, gum, nerve, kidney and cardiovascular disease.

## Hypo (hypoglycaemia)

A lower than normal level of glucose in the blood – usually less than 3.5 mmol/litre. The symptoms of a hypo include feeling dizzy (or even losing consciousness), feeling tired, feeling hungry, shaking and sweating. It is important to recognise the warning signs of a hypo. A severe hypo is where the person with diabetes needs help from someone else to treat the hypo.

## Insulin pump

A small device that is attached to the body and delivers a steady flow of short-acting insulin through a tube and needle into the layer of fat just under the skin. It allows the person to manage their blood glucose levels by modifying the insulin dose.

## Ketones

Harmful ketones in the blood are produced when the body starts to use its fat stores to make energy. It normally only does this if the body has a severe lack of insulin, or during starvation or severe stress. High levels of ketones can lead to diabetic ketoacidosis.

## Metformin

A medicine (tablet) that lowers blood glucose levels in people with type 1 diabetes through improving the action of insulin. Metformin does not increase insulin levels. It can increase the risk of hypos when taken with insulin.

## Nephropathy

Another name for kidney disease. Type 1 diabetes can cause the small blood vessels in the kidneys to be damaged so that they stop working properly. The earliest sign is having a protein called albumin in the urine.

## Neuropathy

Damage or disease that affects the nerves. Type 1 diabetes can cause neuropathy as a result of damage to the small blood vessels that supply nerves. Because nerves affect all parts of the body, neuropathy can have a number of effects.

## 'Off-label' use

In the UK, medicines are licensed to show that they work well enough and are safe enough to be used for specific conditions and groups of people. Some medicines can also be helpful for conditions or people they do not have a licence for. This is called 'off-label' use. Off-label use might also mean the medicine is taken at a different dose or in a different way to the licence. There is more information about licensing medicines on the NHS website.

## Retinopathy

An eye condition where the retina (the seeing part of the eye) is damaged. Type 1 diabetes

can cause the small blood vessels around the retina to become blocked or leaky, or grow in the wrong way, so that light cannot pass through properly.

## Sick-day rules

This refers to what you should do if you are ill, because illness can affect your blood glucose levels. Your diabetes care team should give you information about this that covers things like checking your blood glucose more often, taking more insulin and checking for ketones.

Read more about [making decisions about your care](#).

## Where can I find out more?

The [NHS website](#) has more information about type 1 diabetes.

The organisations below can give you more advice and support.

- [Diabetes UK](#), 0345 123 2399
- [JDRF](#), 020 7713 2030
- [Diabetes Research and Wellness Foundation](#), 023 92 637808
- [InDependent Diabetes Trust](#), 01604 622837

NICE is not responsible for the content of these websites.

To share an experience of care you have received, contact your local [Healthwatch](#).

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## Accreditation

