



Type 2 Diabetes Management and Medication

A charity supporting and listening to people who live with diabetes

HELPLINE: 01604 622837
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- The Trust offers support, understanding and information to people with diabetes and to those who care for them.
- We listen to the needs of people who live with diabetes and do our utmost to offer help and support.
- We raise awareness of important issues for people living with diabetes and lobby governments on issues that affect people's lives.
- We fund research into ways of improving the lives of people with diabetes.

What causes Type 2 diabetes?

In Type 2 diabetes the insulin-producing cells in the pancreas either do not produce enough insulin or the insulin they do produce cannot be used properly by the body (this is called insulin resistance). This means that the body cannot control blood sugar levels properly and gradually blood sugar levels rise (hyperglycaemia).

Because the onset is gradual, Type 2 diabetes can remain undiagnosed for several years. During this time the blood sugar levels are too high and this causes physical damage to the body and some of the complications of diabetes. In fact, people with Type 2 diabetes are often diagnosed as a result of having complications rather than because they suspect they have Type 2 diabetes.

Some Facts about Type 2 diabetes

- Type 2 diabetes affects over 3.5 million people in the UK and it is thought that there may be another half million people living with the condition who are currently undiagnosed.
- There is a tendency for Type 2 diabetes to run in families but a sedentary lifestyle and being overweight or obese are also causes.
- Type 2 diabetes occurs mainly in people over the age of 40. However, with increasing levels of obesity, it is becoming increasingly common in younger people.



Why do blood sugar levels need to be controlled?

As we have already said, blood sugar levels that are too high can cause long-term complications. The risk of developing complications is reduced by treatment of the condition and lifestyle changes. Early diagnosis is also very important as this means that treatment of the condition can begin sooner rather than later.

Good control means trying to keep blood sugar levels consistently as close to a normal level as possible. Once somebody has been diagnosed they may be prescribed medications to improve the body's sensitivity to insulin and to increase the amount of insulin the body produces. Some of these medications can cause the opposite problem and make blood sugar levels drop too low (hypoglycaemia or "hypo"). It is equally important to avoid this as not having a hypo is a major, daily concern for many people with diabetes.

The complications of diabetes commonly affect several areas:

The Eyes – diabetes can affect the blood vessels at the back of the eye (retinopathy) and can lead to visual impairment or blindness.

The Heart and Vascular System – diabetes makes people more susceptible to heart disease and stroke. It can also cause blood clots in the blood vessels in the legs, which may result in amputation.

The Kidneys – diabetes can cause damage to the kidneys or kidney failure (nephropathy).

The Nerves – diabetes can cause nerve damage, resulting in pain, loss of sensation in the feet and ulceration of the legs, which again, can lead to amputation.

How is Type 2 diabetes treated?

The treatment for people who are diagnosed with Type 2 diabetes consists of a combination of three elements:

- Diet.
- Exercise.
- Medication and/or Insulin.

Sometimes Type 2 diabetes can be treated with diet and exercise alone. Often, other medications are also necessary and if this still fails to reduce blood sugar levels sufficiently, then treatment with injections of insulin becomes necessary. On average, people with Type 2 diabetes will need to start taking insulin seven years after diagnosis as the body's ability to produce its own insulin lessens. It is a combination of these three elements that is used to achieve target blood sugar levels and to reduce the risk of complications.

Diet and Exercise alone

When people are first diagnosed it may be that a combination of a healthy, carbohydrate-controlled diet, together with exercise, will have the desired effect of lowering blood sugar levels. However, this may not be appropriate for everyone, for example, those who are not able to take exercise due to other health problems, so other medications may have to be used. Your doctor will be able to advise you what type of exercise is safe for you.

It is recommended that we all take at least 30 minutes of exercise, 5 days a week. Exercise is defined as any activity that makes us slightly out of breath and may be something as simple as a brisk walk. There are several benefits to taking exercise:

- Exercise reduces the risk of heart disease.
- Exercise raises HDL (good) cholesterol levels.
- Exercise lowers blood pressure or can prevent high blood pressure from developing.
- Exercise helps us to reach and maintain a healthy weight.

There are two types of exercise:

Aerobic exercise is good for your heart, increasing the body's demand for oxygen and making the heart and lungs work harder and more efficiently. Some examples are walking, running, swimming, cycling and dancing.

Isometric exercise increases muscle tension without moving a joint, for example pushing against a wall. It does not help the heart and circulation and should be avoided by people with heart disease or high blood pressure because it can increase blood pressure and put the heart under stress.

When people are first diagnosed with Type 2 diabetes, often one of the first and arguably most important pieces of advice they are given is to eat a healthy diet. The recommended diet for people with diabetes is the same standard 'healthy diet' also recommended for the general population, one which is high in carbohydrates, low in fat and with plenty of fruit and vegetables. However, these recommendations were not based on evidence from research and there is now a move to low carbohydrate diets for people with Type 1 and Type 2 diabetes.

If more carbohydrates are consumed than needed for the energy used, then the excess carbohydrates will increase weight in the general population and in people with diabetes.

In people with Type 2 diabetes, greater weight means more medication is necessary. Many experts now favour a low carbohydrate diet or a restriction of carbohydrates by cutting back on sugar and starch. These can be replaced with non-starchy green vegetables and with some fatty foods such as cheese, full fat unsweetened yoghurt along with protein. This cuts down the amount of medication needed and therefore reduces the risk of adverse effects.

Important Note: if you wish to consider using a low or restricted carbohydrate diet and you are taking insulin or medication, we would advise that you discuss this with your diabetes nurse and/or doctor because it could mean a reduction in your insulin or medication doses. It may also be sensible to change slowly to a lower carbohydrate diet so that you can adjust both your appetite and medication.

To follow any diet to the best of their ability, people need to have an understanding of the basic food groups and the effects that these will have on their blood glucose levels/diabetes.

The term 'food groups' refers to a method of classifying foods that are eaten on an everyday basis, according to their nutritional properties. There are five basic food groups, proteins, carbohydrates, fats, fibre, vitamins and minerals.

Proteins – They help your body to grow and repair itself. They are found in meat, poultry, fish, dairy products, eggs and beans.

Fats – They provide energy and help your body to grow and repair itself. They are found in red meats, dairy products, some poultry and fish. Ready meals, cakes and pastries also contain fats.

Fibre – It helps your body to digest food. It is found in cereals, bread, fruit and vegetables.

Vitamins and Minerals – They are good for keeping your body healthy. Vitamins are mostly found in dairy products, fresh fruit and vegetables. Minerals are found in lots of foods but especially in fresh fruit and vegetables.

Carbohydrates – They give you energy. They are sugars and starches and are found in bread, potatoes, rice, pasta, cereals and sugars. Eating carbohydrates directly affects the amount of glucose in the blood.

People who have Type 2 diabetes either do not produce enough insulin or the body does not use correctly the insulin it does produce. So when people with Type 2 diabetes eat carbohydrates their blood glucose levels rise.

Because of this, it is important for people with Type 2 diabetes to keep a check on the amount of carbohydrate they eat. However, it is not just the amount of carbohydrate that is eaten that is important but also the type of carbohydrate.

Quick-acting carbohydrates - Some carbohydrates are quick-acting for example; sweet foods such as cakes, puddings, chocolate and some fruits. Sugary foods will raise blood sugars more quickly and higher in people with diabetes compared to those without diabetes.



Sugary carbohydrates tend not to last as long in the body so blood sugars may drop before the next meal. Sugary carbohydrates tend to make blood glucose levels peak and trough.



Slow-acting carbohydrates - Some carbohydrates are slower-acting and last longer, for example bread, potatoes and high fibre cereals. These carbohydrates do not raise the blood sugars as quickly or as high after eating. They last longer and therefore tend to give more even blood glucose levels.

Drugs used to treat Type 2 diabetes

There are a range of drugs that are used to treat Type 2 diabetes and these should be used alongside diet and exercise wherever possible. There are three main groups of drugs which work in different ways. Several other groups have more recently been introduced and if needed, your doctor will discuss these with you.

- **Biguanides (Metformin/Glucoophage)** – This reduces insulin resistance, which means that it improves the body's ability to use the insulin that is still being produced.

Because it does not increase the amount of insulin the body is producing, it does not cause low blood sugar levels (hypoglycaemia or "hypos"). Its main side-effects are stomach upsets. If Metformin on its own does not control blood sugar levels, then another drug may be added from the range known as **Sulfonylureas**.

- **Sulfonylureas (Glibenclamide, Gliclazide, Glimepiride, Glipizide, Tolbutamide)** – These drugs increase the amount of insulin the body produces. This means that they have the effect of lowering blood sugar levels and can cause hypos. Their side effects can also be stomach upsets and skin reactions.

- **Glitazones (Pioglitazone)**
– This can also be added to the treatment regime. This drug works by reducing insulin resistance in fat tissue, muscles and the liver.

There has been some recent research that shows that it can cause fluid retention.



There are other, newer classes of drugs available to treat Type 2 diabetes which your doctor may discuss with you. The classes are:

- DDP4 inhibitors, such as **Sitagliptin (Januvia)**,
- SGLT2s, **such as Canagliflozin (Ivokana), Dapagliflozin (Forxiga)**
- GLP-1 receptor agonists, such as **Exenatide (Byetta/Bydureon)** and **Liraglutide (Victoza)**. Although the latter are injectable drugs they should not be confused with insulin. The most common side effects are stomach upsets and their main advantages are that they can help people to lose weight.

However, recently combinations of drugs and insulin have been licensed for prescribing in the UK, such as **Suliqua** which is a combination of insulin glargine and lixisenatide.

You should remember that if you are taking any medication that can cause hypos, then you should check your blood sugar levels regularly, particularly if you drive.

You should discuss this with your doctor.



Adding in Insulin

If these medicines still don't control blood sugar levels well enough then the doctor may prescribe insulin.

Treatment with insulin usually begins when the tablets you have been taking are no longer able to control your blood sugar levels sufficiently well. There are risks and benefits to insulin therapy and your doctor or nurse should discuss these with you before you start using insulin. The main risk is the increased possibility of low blood sugar levels (hypoglycaemia or hypos), whereas benefits include more stable blood sugar levels and an improvement in general well-being.

It is important to remember that if/when a person starts to take insulin they do not become a person with Type 1 diabetes, they become a person with Type 2 diabetes who takes insulin!

Before starting on insulin most people will have been taking tablets or other injectable treatments; metformin (Glucophage), is the most common tablet and increases the body's ability to use the insulin it still produces but there are many other medicines used to treat Type 2 diabetes. Because of the way in which these medicines work they can lower blood sugar levels and cause hypos. When you start taking insulin you should fully review the medicines you are taking as these may need to be altered to minimize the risk of hypos.

Your doctor or nurse should show you how to gradually increase your insulin dose until your blood sugar levels are stable at a level agreed at the start of treatment. Regular blood testing and recording is important to avoid hypos and to stabilise your blood sugar levels as quickly as possible. If you do find you are having frequent hypos then you should discuss this with your doctor or nurse and it is likely that they will reduce or discontinue the sulphonylurea.

There are lots of different types of insulin available and they work in different ways.

- **Long-acting** or background insulins are designed to be absorbed gradually, over a long period of time, usually 12-24 hours.
- **Ultra Long-acting** insulins are also designed to be absorbed gradually but over an extended period of time, usually over 24-48 hours.
- **Short-acting** insulins are designed to work quickly and are used to deal with the sharp increase in blood sugar levels that happens after eating a meal.
- **Intermediate-acting** insulins fall between the two.

Usually, your doctor or nurse will advise that you begin by taking a long-acting insulin which should be used once or twice a day, depending on the brand of insulin you are prescribed.

Mixtures of long-acting and short-acting insulins are also available. These are called pre-mixed insulins. These help your body cope with mealtimes as well as having a longer-lasting effect to help throughout the day.

- To ensure that your insulin remains effective, stable and undamaged you should discard your in-use insulin after 28 days as a necessary precaution. Insulin has a use-by date as well as an expiry date and specific insulins may have different times, so you should always check the Patient Information Leaflet inside your insulin pack.
- Unopened insulin should be stored in the fridge but insulin that you are using should be kept out of the fridge in normal temperatures.
- Freezing must be avoided as it can destroy the insulin.
- Most people use their short- or rapid-acting insulin in less than 4 weeks but it is important to check that long-acting insulins are not used for longer than 28 days.

These are designed to be used twice a day. If you and your doctor or nurse think that one of these insulins would suit you then this should be discussed and they should tell you how often and when to inject.

Another option is to inject several times a day. This is called the “basal bolus” or “multiple dose” regime and it works by taking a long-acting insulin once or twice a day and a short-acting insulin at mealtimes.

There are several different devices that can be used for injecting insulin, the most commonly used being an insulin “pen” but other delivery devices are available and each have their own advantages:

Pen - Many people find this to be the most convenient way to inject.

Needle & Syringe – These are used when the insulin is available in vials. Some people prefer to use this method to inject.

Innolet – This is a hand-held device with a large dial used to measure the required number of units of insulin. It makes an audible click when a unit is dialed.

Because of these features it is particularly useful for people with visual impairment or dexterity problems (this is only available with certain brands of insulin).

Insulin Pump – This is a device that supplies a constant dose of insulin. It has distinct advantages and disadvantages and people who use a pump have to satisfy a strict set of criteria before they are prescribed one.

The National Institute for Clinical Excellence (NICE) does not recommend the use of pumps by people who have Type 2 and because of this they are rarely used.

Your doctor or nurse should discuss the options that are available to you so you can decide which to try first. You should also discuss with them about the disposal of needles and blood monitoring lancets so that arrangements are in place for their safe disposal.

Here is a list of things that you should be given before you start using insulin:

- Education about how to use the insulin and the injection device prescribed for you, how insulin works, how it affects the body, and how you need to think about and control what you eat and drink.
- Information about hypoglycaemia, how to best avoid it and what to do if it happens.
- A blood glucose meter to check your blood sugar levels, and information about how to use it.
- How to read the results and how to use them – for example, you should have information on what to do if there are unexpected changes in your blood sugar levels.
- Support (on the telephone and face-to-face) from a doctor or nurse with training and experience in managing insulin therapy.

Nine key tests to be carried out annually

NICE recommends that all people with diabetes should receive nine key tests on an annual basis. These should be carried out at your annual review at your hospital or GP appointment.

These tests are:

- Weight measurement
- Blood pressure
- Smoking status
- HbA1c
- Urinary albumin
- Serum creatinine
- Cholesterol
- Eyes
- Feet



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