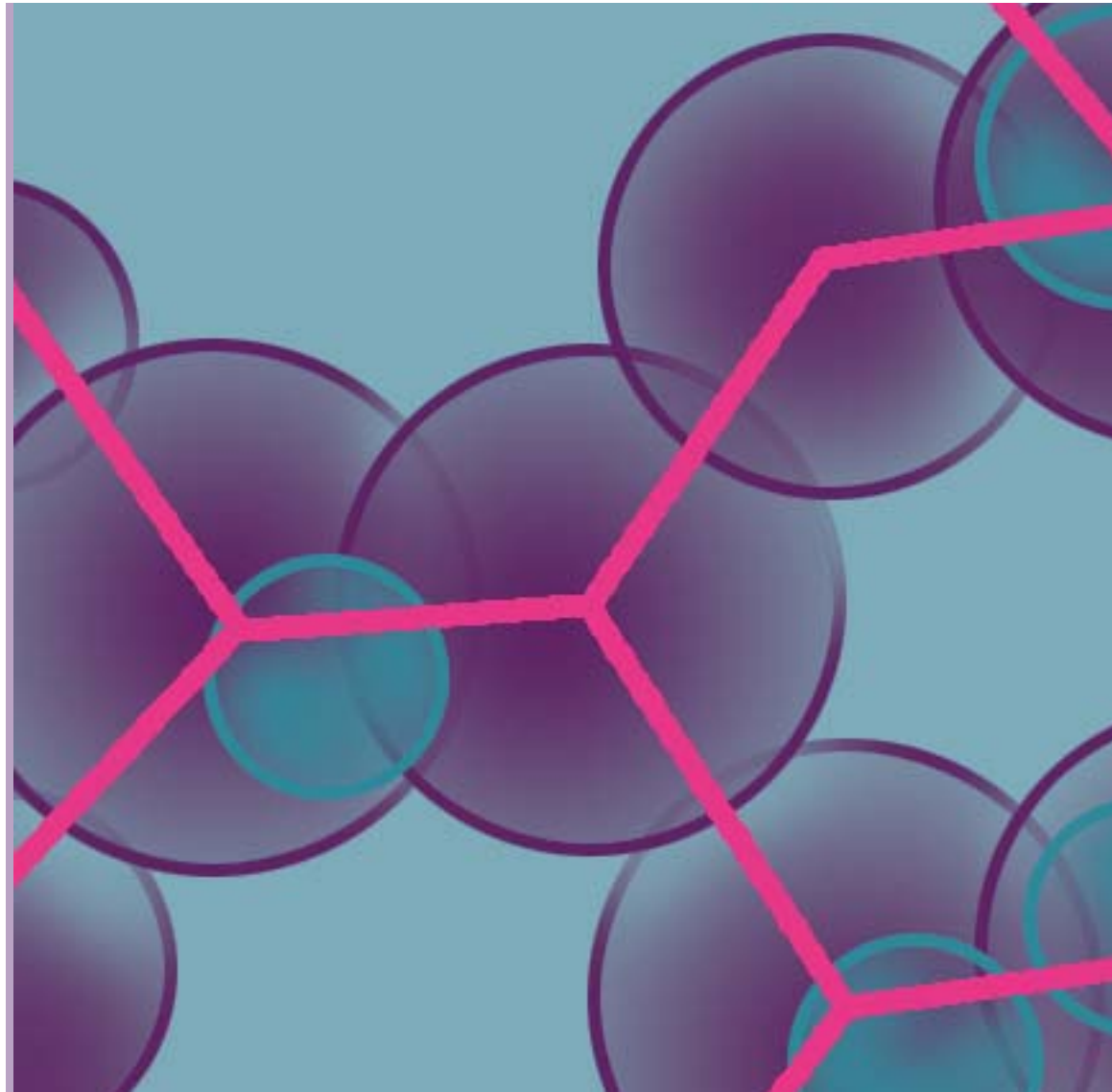


Treating your diabetes with insulin



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Introduction

If you have diabetes, you may be taking insulin as part of your treatment. Insulin is a key part of your treatment that helps your body to use glucose. There are many important facts you need to know about insulin and how to use it.

This booklet covers all aspects of insulin and its use. It is written for anyone who is treating their diabetes with insulin. This includes people who have:

- Type 1 diabetes
- Type 2 diabetes needing insulin.

The information in this booklet may be helpful even if you have been taking insulin for many years. Your family, friends and employer may also find it useful.

As you read the booklet, you may have questions about related topics. Diabetes UK produces many other publications that may help you. Information on these, as well as contact details for Diabetes UK's Careline and Advocacy Service, are at the end.



What is diabetes?

Diabetes is a common life-long condition where the amount of glucose in the blood is too high as the body cannot use it properly. This is because the pancreas does not produce any or not enough insulin or the insulin that is produced doesn't work properly (known as insulin resistance). Insulin helps glucose enter the body's cells, where it is used for energy.

Glucose comes from digesting carbohydrate from various kinds of food and drink, including starchy foods such as breads, rice and potatoes, fruit, some dairy products, sugar and other sweet foods. Glucose is also produced by the liver.

There are two main types of diabetes: Type 1 and Type 2.

Type 1 diabetes develops when the insulin-producing cells have been destroyed and the body is unable to produce any insulin. Usually it appears before the age of 40, and especially in childhood. It is treated with insulin either by injection or pump, a healthy diet and regular physical activity.

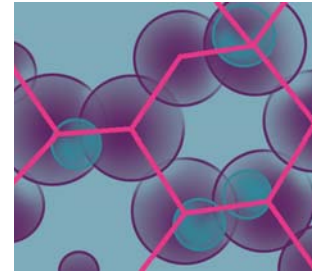
Type 2 diabetes develops when the body doesn't produce enough insulin or the insulin that is produced doesn't work properly. Usually it appears in people aged over 40, though in South Asian and Black people it can appear from the age of 25. It is becoming more common in children and young people of all ethnicities. Type 2 diabetes is treated with a healthy diet and regular physical activity, but medication and/or insulin is often required.

The main symptoms of undiagnosed diabetes include passing urine frequently (especially at night), increased thirst, extreme tiredness, unexplained weight loss, genital itching or regular episodes of thrush, slow healing of wounds and blurred vision.

The main aim of diabetes treatment is to achieve blood glucose, blood pressure and blood fat levels (including cholesterol) within the target ranges agreed by you and your healthcare team. This, together with a healthy lifestyle, will reduce the risk of developing the long-term complications of diabetes such as heart attack, stroke, amputation, blindness, kidney failure and nerve damage.

What is insulin?

Insulin is a hormone produced by the pancreas (which lies behind the stomach). Insulin allows glucose to enter the body's cells, where it is used as fuel for energy so we can work, play and generally live our lives. It is vital for life.



Will insulin make me feel better?

Yes. Together with other aspects of your treatment, insulin will help you keep your blood glucose at near-normal levels most of the time, so you will feel less tired and will have more energy.

Why do I need to take insulin?

In Type 1 diabetes, the pancreas has stopped producing insulin altogether. It is thought that this is because the body's immune system attacks the cells in the pancreas that make insulin. People with Type 1 diabetes have to inject insulin in order to replace the insulin that the body is no longer producing. It cannot be taken in tablet form because, being a protein, it would be digested in the stomach before it had any effect.

In people who have Type 2 diabetes, the pancreas may still produce some insulin, but it either does not produce enough or the body cannot use it properly. Some people with Type 2 diabetes may be able to control their blood glucose through healthy eating and physical activity alone. Others may need to take medication that help their bodies produce more insulin or make better use of the insulin they produce. As diabetes is a progressive condition, some people with Type 2 diabetes may eventually have to switch from other medication to insulin or take a combination of other medication and insulin. They are said to have Type 2 diabetes requiring insulin, as opposed to having Type 1 diabetes.

For how long will I have to take insulin?

If you have Type 1 diabetes, you will have to take insulin for the rest of your life. Some people who have just been diagnosed with Type 1 have a 'honeymoon' period during which they may need very little insulin. This happens after the person begins taking insulin. Somehow, the injected insulin stimulates the pancreas to produce a small amount of its own. Eventually, however, the pancreas 'wears out' and stops producing insulin altogether. Therefore the dosage of insulin must be increased. The honeymoon period can last anywhere from a few weeks to several months, but there is no way to tell how long it will last in each individual. For this reason, regular monitoring of blood glucose levels is very important.

As mentioned above, diabetes is a progressive condition. Therefore, many people who have Type 2 diabetes will begin to need more help managing their blood glucose levels, and so have to take insulin too. Some people with Type 2 diabetes may need to take insulin for only a period of time, for example following admission to hospital.

Does insulin cause any side effects?

The main 'unwanted' effect of insulin is hypoglycaemia (see page 31), but this is not really considered a 'side effect'.

Reactions to the insulin may occur where you have injected (local allergic reaction), including redness, swelling and itching. These should disappear after using insulin for a few days, up to a few weeks. Talk to a member of your healthcare team if this happens.

How is insulin made?

Insulin is a type of protein made up of a series of molecules that resembles a string of beads. In humans and animals, insulin is made by the pancreas. The insulin that people with diabetes inject comes from one of two sources:

Animal insulin

This insulin comes from the pancreas of cows (bovine) or pigs (porcine), which have already been slaughtered for other purposes. Although the make up of this insulin is very similar to that produced by humans, it is slightly different. Because of this, it sometimes causes slight reactions in people, such as itching, bumps or redness around the injection site – but this is rare.

Human insulin

Scientists have discovered a way to engineer certain types of yeast and bacteria to produce insulin that is identical to the human kind. This enables large amounts of purified 'human' insulin to be produced.

Scientists have found a way to further alter the human insulin molecule, producing **human insulin analogues**. If we think of the insulin molecule as being like a string of beads, scientists have managed to alter the position of some of these beads to create 'analogues' of insulin. Currently, there are rapid-acting analogues of insulin and long-acting analogues. These changes affect the way insulin is absorbed after being injected.

The animal/human debate

You may be aware that some people who have switched from animal insulin to human insulin have reported either a change in their symptoms of hypoglycaemia or a loss of their warning symptoms altogether (for hypoglycaemia, see page 31).

Diabetes UK has been actively involved in trying to determine if there is a connection between this loss of symptoms and switching from animal to human insulin, but no definitive link has been proven.

It is now known that 'tight' control of blood glucose levels also causes an increase in hypoglycaemic episodes (hypos), and that the more frequent the hypos, the more likely you are to lose your warning signs.

When human insulin was first produced, it was assumed that this would suit everyone. So insulin manufacturers planned to stop producing animal insulin.

But because some people are unable to switch to human insulin easily, Diabetes UK has successfully petitioned insulin manufacturers and the government to keep animal insulins on the market.

Today, people who are newly diagnosed with Type 1 diabetes are generally given human or analogue insulins rather than animal. However, some animal insulins remain available for those who already use them.

Types of insulin

The first insulin injection was given to a young boy with diabetes more than 80 years ago. Since then, many different types of insulin have been developed, along with several types of injection device.

In people *without* diabetes, blood glucose levels are automatically controlled by the release of insulin from the pancreas.

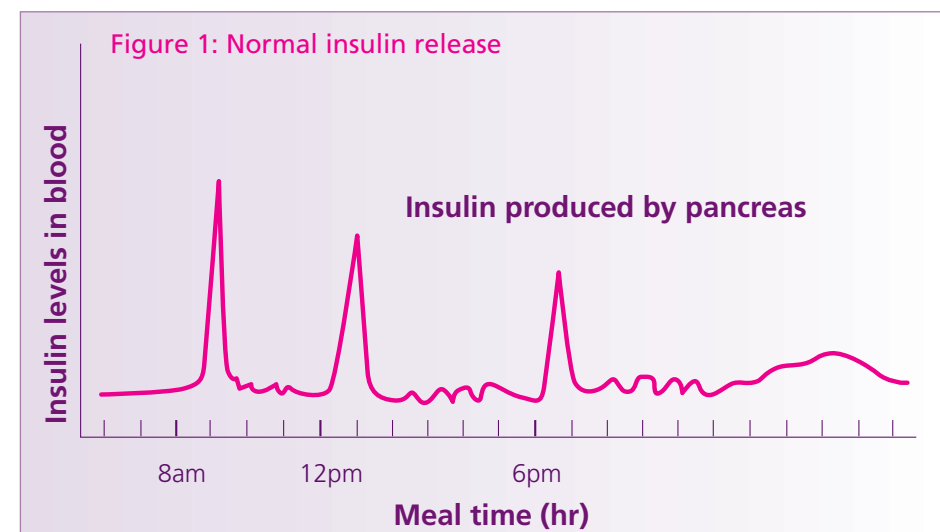


Figure 1, above, shows that small amounts of insulin are released slowly over the whole day, with larger amounts released to deal with the glucose absorbed at mealtimes and from snacks.

The graph shows two types of insulin release, described as 'basal' (background) and 'bolus' (short-/rapid-acting).

Basal (background) insulin deals with the glucose released by the liver.

Bolus (short-/rapid-acting) insulin deals with the carbohydrate from our food and drink intake.

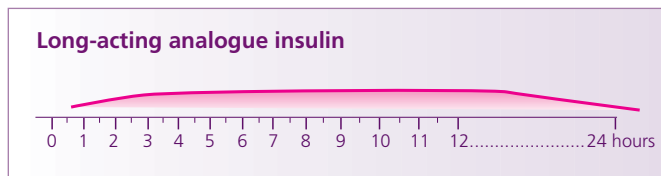
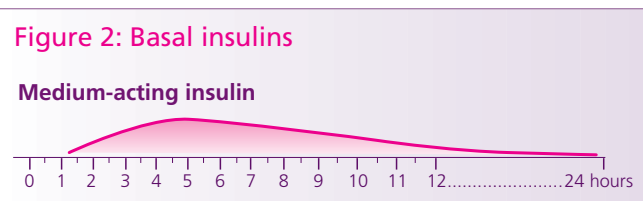
Basal insulins

Two main types of background insulin are available to people with diabetes: medium- and long-acting insulins; and long-acting analogue insulins (see figure 2, below).

Medium- and long-acting insulins

These insulins work over several hours to keep your blood glucose under control. They can be taken once or twice a day, and/or in combination with a regimen of short-acting or rapid-acting analogue injections (also known as a basal bolus regimen).

Medium- and long-acting insulins usually have their peak activity between four and 12 hours after injecting, and can last from eight to 36 hours. These insulins look cloudy. If the cloudiness is uneven, or if you see particles floating in the vial/bottle or cartridge, do not use it.



Long-acting analogue insulins

Unlike other long-acting insulins, these are clear and don't have a peak action. They can be taken once or twice a day, lasting about 24 hours. Only use if they are clear and have no visible particles.

Bolus insulins

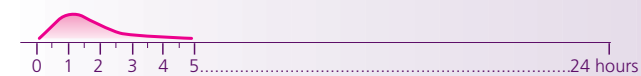
There are two main types of bolus insulin: rapid-acting analogue and short-acting insulin (see figure 3, opposite).

Rapid-acting analogue insulins

Convenient for many people, these types of insulin can be injected five to 15 minutes before eating, when eating or immediately after eating. They can last for between two and five hours but, as they act rapidly, they may not last quite long enough to control blood glucose levels between meals and may need to be used along with a longer-acting insulin. These insulins are clear. If you see 'frosting' around the bottle or particles in the insulin, do not use it.

Figure 3: Bolus insulins

Rapid-acting analogue insulin



Short-acting insulins

These work quickly to lower your blood glucose. They are usually taken 15 to 45

Short-acting insulin



minutes before a meal to cover the rise in blood glucose that occurs after eating. They have their peak activity within two to six hours after injecting and can last for up to eight hours. These insulins should always appear clear. If they are cloudy or you see particles, do not use them.

Mixed insulins

Some people need to take injections of mixed insulin, giving a mixture of basal (medium-/long-acting or long-acting analogue) and bolus (short-acting or rapid-acting analogue) insulins in one injection.

This means that the injection given in the morning will provide bolus insulin to cover breakfast and the basal will continue to work for longer, running out around dinnertime, also covering carbohydrate eaten at lunchtime. The second injection, given

before dinner, will provide bolus insulin to cover food intake at dinnertime and basal insulin to cover the glucose released from the liver overnight.

There are two groups of mixed insulins: mixed insulins and analogue mixtures.

Mixed insulins

These are a combination of medium- and short-acting insulin. They are usually given twice daily 20 to 45 minutes before food. Their peak activity and duration can vary. They can also be taken once or twice a day to provide background insulin and/or in combination with a regimen of short-acting insulin or rapid-acting analogue injections. Mixed insulins should be cloudy in appearance before they are given. Do not use if you see any particles.

Analogue mixtures

These are a combination of medium-acting insulin and rapid-acting analogue. They are usually given twice daily, just before, with or after food. Their peak activity and duration can vary. They can also be taken once or twice a day to provide background insulin and/or in combination with a regimen of short-acting insulin or rapid-acting analogue injections. Analogue mixtures should be cloudy in appearance before they are given. Do not use if you see any particles.

Insulin regimens

Different people will have different regimens depending on their individual circumstances and needs. You can work with your healthcare team to tailor your insulin regimen to suit you. If it is not suitable, the type or dosage of insulin can be changed. Some people use a combination of short-acting insulin with medium- or long-acting insulin. Others may simply use one injection of medium- or long-acting insulin. Some people mix their insulins themselves; others prefer pre-mixed insulins.

Insulin packages

Several different makes of insulin are available, and each company produces a range of insulins.



Depending on the type of injection device you use, the insulins you take (animal, human or analogue) will be packaged in vials (bottles), cartridges or pre-filled pens. Vials are used with syringes and cartridges are used with pen injectors. Vials, cartridges and pre-filled pens are packaged with instructions that answer some basic questions about insulin and injections.



Turn over for a guide to
insulins available in the UK



Insulins available in the UK

Name	Manufacturer	Source	Delivery system	Taken
RAPID-ACTING ANALOGUE				
NovoRapid	Novo Nordisk	Analogue	Vial, cartridge, pre-filled pen	Just before/with/just after food
Humalog	Lilly	Analogue	Vial, cartridge, pre-filled pen	Just before/with/just after food
Apidra	Sanofi-Aventis	Analogue	Vial, cartridge, pre-filled pen	0–15 mins before, or soon after, a meal
SHORT-ACTING INSULINS				
Actrapid	Novo Nordisk	Human	Vial	30 mins before food
Humulin S	Lilly	Human	Vial, cartridge	20–45 mins before food
Hypurin Bovine Neutral	Wockhardt UK	Bovine	Vial, cartridge	30 mins before food
Hypurin Porcine Neutral	Wockhardt UK	Porcine	Vial, cartridge	30 mins before food
Insuman Rapid	Sanofi-Aventis	Human	Cartridge, pre-filled pen	15–20 mins before food
MEDIUM- AND LONG-ACTING INSULINS				
Insulatard	Novo Nordisk	Human	Vial, cartridge, pre-filled insulin doser	About 30 mins before food or bed
Humulin I	Lilly	Human	Vial, cartridge, pre-filled pen	About 30 mins before food or bed
Hypurin Bovine Isophane	Wockhardt UK	Bovine	Vial, cartridge	As advised by your healthcare team
Hypurin Bovine Lente	Wockhardt UK	Bovine	Vial	As advised by your healthcare team
Hypurin Bovine PZI	Wockhardt UK	Bovine	Vial	As advised by your healthcare team
Hypurin Porcine Isophane	Wockhardt UK	Porcine	Vial, cartridge	As advised by your healthcare team
Insuman Basal	Sanofi-Aventis	Human	Vial, cartridge, pre-filled pen	45–60 mins before food or bed

Continued overleaf

Insulins available in the UK

* Mixtard 30 will no longer be available from 31 December 2010. For **further information** on how this may affect you, please speak to **your GP** or a member of your **diabetes team** at the hospital.

Name	Manufacturer	Source	Vial, cartridge or pen	Taken
MIXED INSULINS				
* Mixtard 30	Novo Nordisk	Human	Vial, cartridge, pre-filled insulin doser	30 mins before food
Humulin M3	Lilly	Human	Vial, cartridge, pre-filled pen	20–45 mins before food
Hypurin Porcine 30/70 Mix	Wockhardt UK	Porcine	Vial, cartridge	As advised by your healthcare team
Insuman Comb 15	Sanofi-Aventis	Human	Pre-filled pen	30–45 mins before food
Insuman Comb 25	Sanofi-Aventis	Human	Vial, cartridge, pre-filled pen	30–45 mins before food
Insuman Comb 50	Sanofi-Aventis	Human	Cartridge	20–30 mins before food
ANALOGUE MIXTURE				
Humalog Mix 25	Lilly	Analogue	Cartridge, pre-filled pen	Just before/with/just after food
Humalog Mix 50	Lilly	Analogue	Cartridge, pre-filled pen	Just before/with/just after food
NovoMix 30	Novo Nordisk	Analogue	Cartridge, pre-filled pen	Just before/with/just after food
LONG-ACTING ANALOGUE				
Lantus	Sanofi-Aventis	Analogue	Vial, cartridge, pre-filled pen	Once a day, anytime (but at same time each day)
Levemir	Novo Nordisk	Analogue	Cartridge, pre-filled pen, pre-filled insulin doser	Once or twice daily

* If you have any further questions about the discontinuation of Mixtard 30 please call the **Novo Nordisk** dedicated helpline on **0845 600 5055**.

This information is correct at the time of print. To check for the most up-to-date information, please visit www.diabetes.org.uk

Taking insulin

As mentioned on page 5, insulin is a protein. Therefore it cannot be taken in tablet form because it would be digested by the stomach the same way that we digest other types of protein, such as those in cheese and meat.

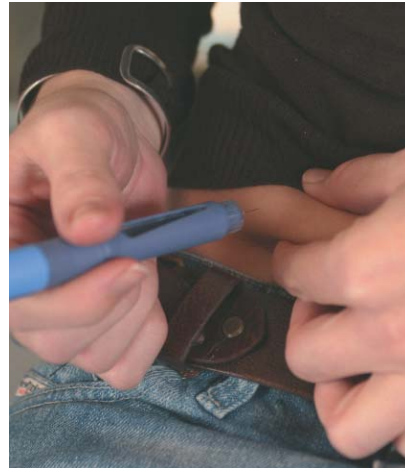
If digested, insulin would not be able to carry out its function of transporting glucose from the bloodstream. As such, the only way to get insulin is to inject it using a small syringe or pen injector, or via a pump. The needle is small because the insulin only needs to be injected under the skin (subcutaneously), not into a muscle or vein.

Once it has been injected under the skin, insulin is absorbed into small blood vessels and arrives in the bloodstream.

How often do I have to inject?

A member of your diabetes healthcare team will advise you on the amount, timing and frequency of your injections. There is no maximum or minimum dosage of insulin – the amount you take depends on your body weight, what you eat, how much physical activity you take and how your body responds to insulin.

Your doctor or diabetes specialist nurse will show you how to adjust your insulin dose up or down, depending on your blood glucose levels, intended food intake and level of physical activity. By checking your own blood glucose levels, you will learn how to balance your dosage with these other factors.



Does it hurt to inject insulin?

Some injections can be a little painful, especially the first few, because you may be tense and anxious. But as your confidence increases and you become more relaxed about injections, they will become easier and less painful. (See tips for more comfortable injections on page 26.)

You may also find that certain areas are more comfortable to inject into than others, and you will learn by experience which these are (**but it is important not to inject into the same small area every time – see page 24**). These days, the needles on syringes are short (less than 13mm) and thin. They have an angled tip and are lubricated to help them slide into your skin more easily. It is recommended that you use a new needle every time you inject.

Using the right injection technique and injecting quickly can also help make injections as painless as possible. If you want advice on the best way to inject, speak to a member of your diabetes healthcare team.

What types of injection devices are there?

There are two types of injection device that are commonly used: a standard plastic disposable **syringe** and a **pen injector**.

Syringes come in three sizes: 1ml (100 units), 0.5ml (50 units) and 0.3ml (30 units). The size you use depends on the amount of insulin you are taking.

Syringes and pen injectors both have needles. The syringe needles are sometimes slightly longer, but some people find pen injectors more convenient to use. Some pen injectors can also make the process easier for people whose eyesight is not as good as it was; you dial the dosage by turning the handle at the end of the pen, and it clicks. This lets you 'hear' the number of units being drawn up.

Pen injectors are also helpful for people who have lost some mobility in their hands, perhaps through arthritis, and who find drawing up insulin difficult.

You can get pens that are pre-loaded with insulin. These may be helpful if you have difficulty loading the insulin cartridges into a normal pen device. They should be thrown away when empty.

With any pen injector there is a chance that insulin will crystallise in the needle and block it. So when changing the needle, make sure that insulin is coming through the needle before injecting by doing a 'safety shot'. Talk to a member of your diabetes healthcare team about how to do this.

When you've finished using a pen injector, remove the needle and put the cap back on the pen. This is to prevent air getting into the cartridge or insulin escaping from it.



The above represents some of the pen devices available. For information about all devices available, contact a member of your diabetes healthcare team

Syringes and most pen injectors are available on prescription. After a successful campaign by Diabetes UK, the needles for pen injectors are also available on prescription. There are six lengths of needle and four different gauges or widths. Based on your body size, your healthcare team can advise which size is best for you.

An **auto-injector** is also on the market. It is like a pen injector, but the needle is hidden from view before inserting into the skin at the touch of a button. If you are interested, ask your diabetes healthcare professional team.

Needle-free **jet injectors** are another type of injection system. Jet injectors use high pressure to deliver insulin in a tiny liquid stream directly through the skin. As the device does not use a needle, some people prefer it. Other people have found that the high pressure causes bruising on their skin. These devices can be expensive, though they are available on the NHS. Their long-term effects on tissues are not known.

Lastly, the **insulin pump** is about the size of a pager and delivers a steady flow of rapid-acting analogue insulin around the clock. In this way it imitates a healthy pancreas. The pump has a reservoir holding two to three days' supply of insulin, which is delivered through an infusion set – a very fine tube with a soft plastic cannula, which is inserted under the skin (usually the abdomen) and can be left in place for two to three days.



You control the amount of insulin by presetting the quantity to be given throughout 24 hours (the basal/background rate), but then giving extra insulin (a bolus), usually before each meal. A registered dietitian teaches you how to work out the carbohydrate content in a meal, enabling you to give the appropriate bolus dose. A bolus can also be given if blood glucose levels have risen too high. This provides near-normal control, matching each user's individual lifestyle, and can therefore also decrease the risk of hypoglycaemic events ('hypos' – see page 31).

Who can use an insulin pump?

In July 2008, the National Institute for Health and Clinical Excellence (NICE) issued revised guidance on insulin pump therapy for people with Type 1 diabetes. According to the revised guidance, children with Type 1 under the age of 12 may be able to access insulin pump therapy if multiple daily injection (MDI) is considered impractical or inappropriate. However, once within the age range of 12 to 18 years, before trying a pump, they will be expected to have a trial of MDI if they did not do so prior to using a pump.

For people 12 years and older with Type 1 diabetes, insulin pump therapy is recommended provided that:

- attempts to achieve target HbA1c levels using MDI result in 'disabling hypoglycaemia'*

OR

- HbA1c levels have remained at 8.5 per cent or above, despite a high level of care.

Insulin pump therapy is not recommended for the treatment of Type 2 diabetes.

Injection devices should be available to people with diabetes based on individual clinical need and suitability.

You and your healthcare team should discuss if insulin pump therapy is a suitable choice. If you decide that this is the right treatment, funding for the pump and 'disposables' (tubing and needles) will come from the NHS. Should you not meet the criteria and still want to use a pump, you would have to pay for everything, except the insulin, yourself.

Pumps cost between £2,000 and £3,000, and usually last for four years. The consumables cost about £1,700 per year.

For more information, visit Diabetes UK's website: www.diabetes.org.uk

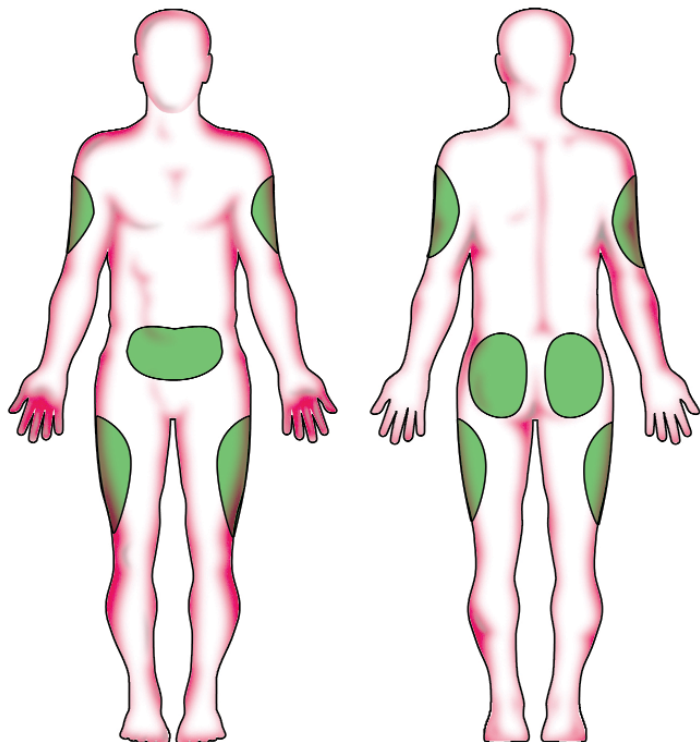
* Disabling hypoglycaemia is when you have repeated and unpredictable hypos that mean you are constantly worried about them happening. It can have a significant negative effect on your quality of life.



Choosing an injection site

There are three main sites on the body into which you can inject insulin: the stomach, buttocks and thighs. Sometimes your diabetes healthcare team may recommend other sites, such as the upper arms.

As you can see below, each of these sites covers a wide section of skin, so you can inject at different points within each area – this is called ‘rotating’ your injection sites. It is important to rotate injection sites, as injecting into the same site can cause a build-up of lumps under the skin (also known as lipohypertrophy), which may lead to erratic absorption of the insulin and then affect control of blood glucose levels.



What's the difference between injecting into different sites?

Insulin can be absorbed at different rates from different sites around the body. When you rotate these sites, it may have some effect on your blood glucose control. Generally, insulin is absorbed most quickly from the stomach area, less quickly from the thighs and least quickly from the buttocks.

Can anything else affect how long it takes to absorb insulin?

There are several other things that can speed up the action of insulin after it has been injected. This may make a hypo more likely, so you need to be aware of it and check your blood glucose levels more frequently. Factors include:

- **heat:** sunbathing or taking a hot bath or sauna.
- **physical activity or exercise:** exercising a limb into which you've just injected insulin can cause the insulin to work faster. For example, injecting into your leg and then jogging.
- **massage:** massaging the area where you have injected insulin.

What should I do if there is blood or insulin leaking from where I've injected?

Blood

Occasionally, you may notice a spot of blood when you withdraw the needle. Don't worry, this will not harm you. It is just a sign that you have punctured a small blood vessel. If this happens, you may get a bruise or a swelling around the injection site, and it may also be painful. Some people bruise more easily than others, so if this is a problem talk to someone from your diabetes healthcare team.

Insulin

Sometimes, when you have withdrawn the needle from your skin, you may notice a small amount of insulin leaking out. Keep the needle in for 10 seconds after injecting to help prevent leakage.

If leakage happens, it is a good idea to do extra blood tests some time after your meal. Do not give yourself a second injection to make up the amount you have lost. If you notice regular leakage, speak to your healthcare team – they can help you to adjust your injection technique.

Tips for more comfortable injections

- Very cold insulin can make injections more uncomfortable, so try not to use it straight from the fridge.
- Choose a body area for your injection that has plenty of fatty tissue.
- If you have been advised to, pinch up the skin and insert the needle at an angle of 90 degrees. Don't pinch up the skin too firmly, because this will make the injection more painful.
- Always insert the needle quickly.
- If you still find injections painful, try numbing the area by rubbing a piece of ice on the injection site for 15 to 20 seconds before injecting.
- People do use needles for more than one injection, but they are recommended for *single use only*. Very fine needles may blunt more quickly and reusing them may cause injections to be more painful and increase the risk of the needle bending and breaking.



Insulin and its equipment

Where can I get insulin and injection devices?

Insulin, insulin pens, pen needles and disposable syringes are available by doctor's prescription. People on insulin are entitled to free prescriptions. Ask for a prescription exemption form from your GP surgery or local NHS trust.

When you collect your insulin from the chemist, always check the pack and the label of the vials/cartridge/pre-filled pen to make sure it is the type your doctor has told you to use. Also check that it has not passed its expiry date.

Never share your syringes with anybody else.

How should I store my insulin?

Insulin needs to be kept at a temperature lower than 25°C. Normal room temperature is usually below 25°C, but can be warmer during a hot summer. The best way to store insulin at all times of the year, therefore, is in the refrigerator, at 2 to 8°C and away from the freezer compartment. This is not essential for the open vials and cartridges or pre-filled pens you use every day, but these must be discarded after 28 days. Do not store in the freezer.

Where should I pack my insulin when travelling?

It is best to keep the insulin in an insulated container, such as a cool bag or wide-necked vacuum flask, which you can buy from a chemist or department store. You may have picnic equipment that you can use for this purpose. Specially designed pouches and containers for insulin storage are available from diabetes mail order companies or Diabetes UK (visit www.diabetes.org.uk/shop).

When travelling by air, always carry your insulin (and spare pens, needles and syringes) in your hand luggage, both to



avoid it freezing in the aircraft hold and to make sure that it is not lost if your luggage is misplaced or stolen.

If you are advised to pack spare supplies of insulin in your main luggage, put them in the middle of the suitcase in a flask or bubble wrap and towel.

Before you travel you should contact the insulin company that produces your insulin to check on its availability in the country or countries you are visiting. If it's not available, they will be able to tell you about the most appropriate alternative.

Dos and don'ts for storing your insulin properly

Do:

- keep your insulin in the fridge
- keep in the fridge at least one spare vial or cartridge of each type of insulin you take
- check the pack for the expiry date.

Don't:

- use insulin if it has gone past its expiry date
- place insulin in, or close to, the freezer compartment
- use insulin if it has frozen
- expose the vials, cartridges or pre-filled pens to sunlight or high temperatures (eg near a cooker) or on top of electrical equipment (such as a television or computer)
- keep insulin vials, cartridges or pre-filled pens in the car during hot weather.

How should I throw away any used equipment?

Syringes and pen needles are designed for single use only.

It is important to use a sharps bin to properly dispose of your old syringes, pen needles, pre-filled pens and lancets (needles for the finger pricking device you use when monitoring your blood glucose levels). This will help avoid injury to other people, such as children or refuse collectors.



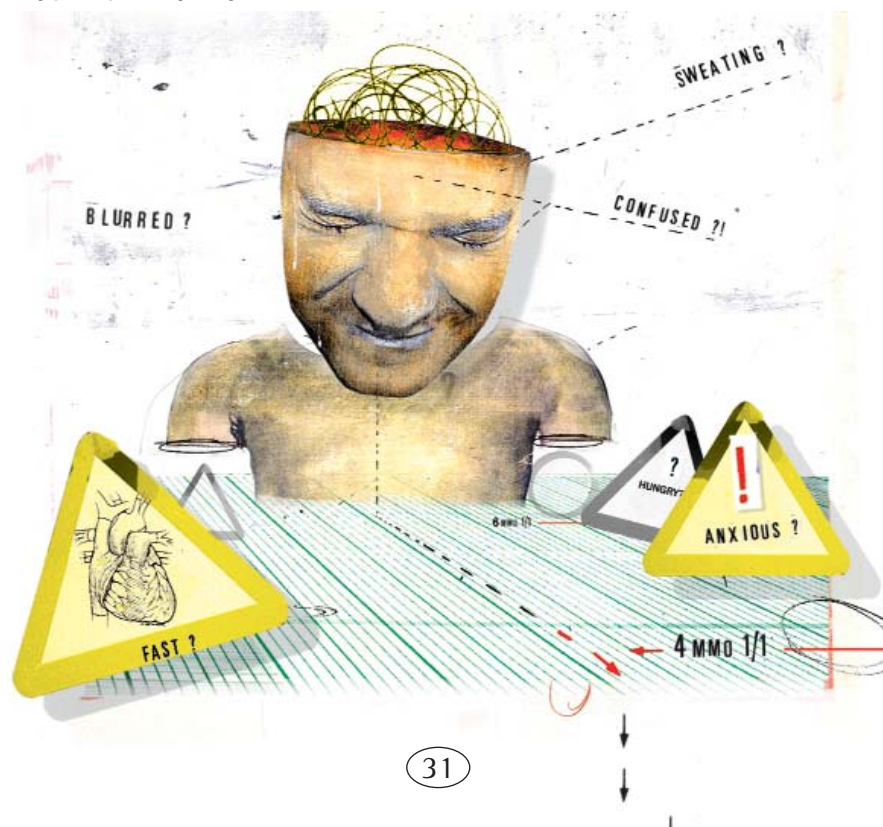
- Sharps bins are available on prescription. Speak to a member of your diabetes healthcare team about methods of sharps disposal in your area.
- Use a needle clipper such as the BD Safeclip (available on prescription) to snap the needle off your syringe or pen injector. The BD Safeclip holds about 200 needles. When it is full, dispose of it in your sharps bin.

Hypoglycaemia

Hypoglycaemia, or hypo, is the medical term for low blood glucose levels – that is a blood glucose level of less than 4mmol/l. This is too low to provide enough energy for your body's activities.

Hypos can happen when you are treated with insulin or some other diabetes medication. No matter how much you know about diabetes or how careful you are, if your diabetes is treated with certain medication, you are likely to experience some hypos.

Although hypos can be unpleasant, there are things you can do to reduce the risk of having them. There are also ways to treat a hypo quickly if you do have one.



A hypo can be caused by:

- too much insulin/other diabetes medication
- a delayed or missed meal or snack
- not eating enough food, especially carbohydrate
- unplanned or strenuous activity
- drinking too much alcohol or alcohol without food.

Sometimes there is no obvious cause.

The signs of a mild hypo can include:

- feeling hungry
- sweating
- going pale
- tingling of the lips
- trembling or shakiness
- anxiety or irritability
- fast pulse or palpitations
- blurred vision.

The signs of a more severe hypo can include:

- difficulty in concentrating
- vagueness or confusion
- irrational behaviour.

The signs vary from person to person. The blood glucose level at which you may feel a hypo also varies among people.

Immediate treatment

Once you notice your hypo warnings, take action quickly or the hypo is likely to become more severe, and you may become unconscious or have a fit.

Immediately treat with a short-acting carbohydrate, such as:

- a glass of Lucozade or non-diet drink
- three or more glucose tablets
- five sweets, eg jelly babies
- a glass of fruit juice.

The exact quantity will vary from person to person. If your hypo is more severe and you cannot treat it yourself, someone else can help you by:

- applying GlucoGel (or treacle, jam or honey) on the inside of your cheeks and gently massaging the outside of your cheeks
- injecting glucagon, if you are unconscious and the person you are with has been trained to use it. Otherwise, they should call for an ambulance immediately.

Important

If you are unable to swallow or are unconscious, you should not be given anything by mouth (including GlucoGel, treacle, jam or honey). Make sure your family and friends are aware of this. If you are unconscious, you should be placed in the recovery position (on your side with your head tilted back), so that your tongue does not block your throat. An ambulance should be called immediately.



Follow-on treatment

To prevent your blood glucose levels from dropping again, you should follow your sugary foods with a longer-acting carbohydrate.

Follow-on treatments include:

- a sandwich
- biscuits and milk
- fruit
- a bowl of cereal
- the next meal, if due.

It is important not to let hypos prevent you from living a full and active life. Although they are unpleasant, the risk of having a hypo can be lessened by planning ahead. If you know you are going to undertake physical activity, it is important to eat some form of carbohydrate before, possibly during and after your activity, especially if it is strenuous or lasts a long time.

Hypos can happen up to 36 hours after strenuous or prolonged physical activity, so you may need to adjust your medication or carbohydrate intake to compensate. If you think your hypo warning signs have decreased, talk to your doctor or diabetes specialist nurse about this right away.

Points to remember

- Always have something sugary with you for use in an emergency.
- Wear some medical ID.
- Tell your friends or family what signs you have when you go hypo and how to treat it, as you may not be able to think clearly when your blood glucose goes low.
- If you do become unconscious through a hypo, your body will eventually release its stores of glucose into the blood and you will recover.
- You will come to recognise your own hypo warning signs, but these may change over time, so be prepared to check your blood glucose level if you experience any unusual symptoms.

Insulin and your food

Balancing your diet when you are using insulin to manage your diabetes can be challenging, but it is important. Making sensible food choices and adapting your eating habits will help you manage your diabetes and protect your long-term health. The good news is that you should still be able to enjoy a wide variety of food and drink.

How will eating out affect my injection routine?

Eating out would mean a change to your injection routine if the meal is likely to be at a different time from the one you are used to. With a bit of careful planning, you can still enjoy yourself. You could, for example, have a small snack at your usual mealtime and take your injection in the restaurant after ordering. You may need to take a larger dose of insulin if the portions of starchy carbohydrate food are bigger than you usually have.



If your meal is delayed, do not be embarrassed to ask for nibbles containing carbohydrate. Restaurant staff are usually very willing to bring bread to the table before your meal. Careful blood glucose testing before and after your meal will help you decide how best to deal with eating out. It is nearly always a matter of trial and error at first. If you need any further advice, ask a member of your diabetes healthcare team.

Can I drink alcohol?

Having diabetes does not mean that you need to give up drinking alcohol. But alcohol lowers your blood glucose level and can make you more likely to have a hypo (see page 31). It is therefore a good idea to check your blood glucose level before you have a drink and before you go to bed if you have been drinking. Never drink on an empty stomach, and be sure to eat a snack containing carbohydrate (eg a sandwich) when you drink. After drinking, there may be a particular risk of having a hypo in the early hours of the morning when you have not eaten for a few hours, so remember to have a bedtime snack. It is important not to miss meals when drinking alcohol and to take regular snacks.

Diabetes UK recommends a maximum alcohol intake of no more than two units a day for a woman and no more than three units a day for a man.



1/2 pint ordinary strength lager, ale, bitter or cider = 1–1 1/2 units

1 pub measure of sherry = 1 unit

One 175ml glass of wine = 2 units

1 pub measure of spirits (25ml) = 1 unit

Insulin and when you are ill

Illness and infections, like other forms of stress, will raise your blood glucose levels with Type 1 and Type 2 diabetes. This is because part of the body's defence mechanism for fighting illness and infection puts more glucose into the bloodstream and prevents insulin from working properly. This happens even if you are off your food or eating less than usual.

Even if you are unable to keep food down, you must keep taking your insulin – and you may need to increase the dose. It is very important to do regular blood or urine tests four or more times a day and night (ie at least eight times in a 24-hour period).



If you cannot eat properly, replace your meals with carbohydrate-containing drinks such as milk and other milky drinks, fruit juice or sugary drinks.

If you have Type 1 diabetes, you will also need to test your urine/blood for ketones if your blood glucose is higher than 15mmol/l. Some glucose meters also measure blood ketones. Never stop taking your insulin. Call a member of your diabetes healthcare team for advice if your blood glucose levels are high and you have ketones in your urine or blood.