

## How to look after diabetes when unwell

Every child becomes unwell some time. During illness diabetes can become more unstable, with high or low blood glucose results. This can be worrying, but most people can be looked after at home, and you can always call for help if you need it.

### Illness causing a low blood glucose

The most common problem causing low blood glucose is a diarrhoea and vomiting illness. Vomiting may make it difficult to keep down enough carbohydrate, and diarrhoea can reduce absorption of food. Both can make it difficult for the blood glucose to stay at a reasonable amount.

Someone in this situation will already have a falling blood glucose, and will probably not feel like eating or drinking properly to increase the blood glucose again. It is often difficult to take the usual meals and snacks, but the same amount of carbohydrate might be taken in a simpler, more easily absorbed form. For example, jelly with sugar in it might be more easily swallowed and kept down than a sandwich or some pasta. The blood glucose will also increase more quickly.

Even if not well enough to eat, children can often take fluids. A day's carbohydrate can be given as sugary drinks, such as Lucozade® (50 ml hourly), non-diet soft drinks (100 ml hourly), or original Ribena® (1 tablespoon diluted in water), and so on. If a child is vomiting or has diarrhoea, it is important to give enough fluid to prevent dehydration, so non-sugary drinks should also be frequently offered. Something light such as a slice of toast or a dry biscuit could be tried if the child is hungry. See [Pages 50-52 in the "Food for Life" diet book](#) for ideas on giving carbohydrate when ill.

A person with diabetes should **never stop insulin** or carbohydrate during health or illness!

The body makes ketones when there is too little insulin available for its needs, and **not** because of high blood glucose results. This means that ketones may occur even when the blood glucose is normal or low. To prevent hypoglycaemia, and to allow enough insulin to be given to prevent ketone production, enough carbohydrate must be taken. **Never stop insulin, and never stop carbohydrate.**

### Illness causing a high blood glucose

Illness may have no impact on diabetes at all. On the other hand, a sore throat or a chest infection might cause problems with high blood glucose results because the body needs *more* insulin when it is ill. The pancreas would normally just make more insulin, but when someone has injected insulin, they must increase the doses taken.

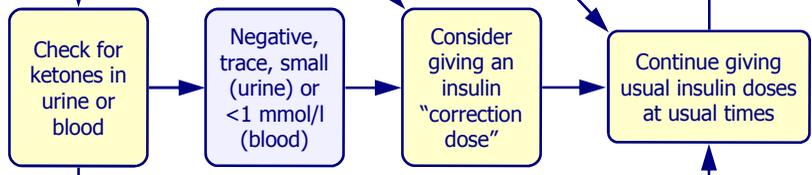
It is very important to look for ketones when someone with diabetes is not well, or whenever the blood glucose result is over 14 mmol/l. The urine can be tested, and some meters will also directly measure ketones in the blood. If an increase in ketones is found, this shows that the body urgently needs more insulin. The guidelines on the next page must be followed closely, or the situation can become very serious.

See Also: **Sick Day Guidelines** (Page G 07), **Illness, Insulin & Ketones** (Page I 25), and "**Food for Life**" dietary companion guide to this Record

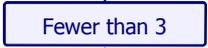
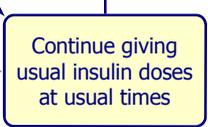
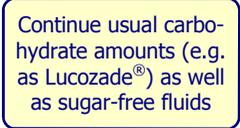
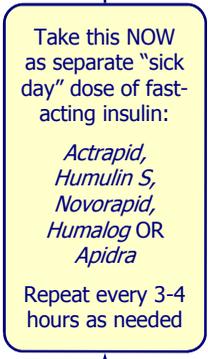
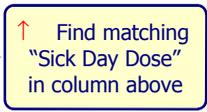
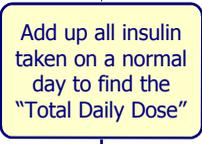
# What to do when unwell or blood glucose over 14

**Start**

Check blood glucose before meals, before bed, and every 3 to 4 hours overnight



If Total Daily Insulin Dose:	Then Sick Day Dose is:
1 - 10	→ 1 unit
11 - 20	→ 2
21 - 30	→ 3
31 - 40	→ 5
41 - 60	→ 7
61 - 80	→ 10
81 - 100	→ 13
Over 100	→ Call



**Call for advice (See Page S 00 in the "Start" Section for contact details) if:**

1. requiring third sick-day insulin dose in a row
2. vomiting persists
3. child looks ill (sleepy, dry mouth, sunken eyes), or
4. YOU ARE WORRIED FOR ANY REASON

Print off an extra copy from the [www.diabetes-scotland.org/ggc](http://www.diabetes-scotland.org/ggc) website and attach to your refrigerator door for handy reference!

**Guidelines**

! For more on ketones and illness, see page I 25 in the Information section

# Insulin, Illness and Ketones

Just as a car needs petrol to run, so the body needs fuel to keep going. Food is the body's fuel, and the energy comes from the **carbohydrate**, **fat** and **protein** found in food. Glucose is a type of sugar, and is a basic, or "simple", form of carbohydrate.

Muscles generally use glucose for energy, and insulin allows that glucose to move from blood into the muscles. Insulin also helps store glucose in the liver for later use (such as when sleeping overnight). Insulin, then, acts like a "key" to a door, allowing carbohydrate to pass from the blood into muscle and liver.

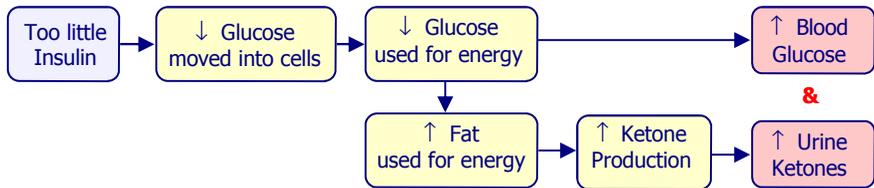
Insulin ... acts like a "key" to a door ...

There are times when the body can no longer use carbohydrate for energy - there is either not enough glucose available, or not enough insulin to move the glucose into the muscles. Another energy source is used - the body's reserves of fat. For short periods, this is useful. However, using fat for energy produces **ketones** - acids that poison the body, and cause a person to become very ill. Ketones can be extremely dangerous, and large amounts may even be life-threatening.

When someone is ill (such as with a viral illness, like the 'flu or gastroenteritis) their body becomes "stressed". **Steroids** are released that help cope with this stress, and these release glucose from the liver to provide extra energy. Steroids also increase fat breakdown for energy, and so also increase ketone production.

... during illness normal daily insulin doses may not be enough ...

During illness, someone *without* diabetes simply makes whatever insulin is needed to keep blood glucose normal. Less energy from fat is needed, and fewer ketones are produced. However, if someone *has* diabetes **normal daily insulin doses may not be enough to stop fat breakdown and ketone production** - this is why more insulin is needed during times of illness or stress.



**The problem is too little insulin** - *not* too much sugar! Glucose results usually *do* rise with illness, but **ketone production is the main concern**. Too little insulin usually causes *both* a rise in glucose *and* a rise in ketones. Urine or blood should always be tested for ketones when blood glucose rises above 14 mmol/l, or when someone with diabetes becomes unwell - this is when ketones are most likely to develop.

Even if unable to eat normally, someone with diabetes usually needs *more* insulin to stop ketones forming. If they cannot take enough carbohydrate (as **Lucozade®**, **sugary drinks** or **ice cream** if not eating normally), or take enough sugar-free fluids to avoid dehydration, admission to hospital may be needed. The "Food for Life" diet book has more information on food and drink choices for times of illness.

# Diabetic Ketoacidosis – an avoidable emergency!

## What is it, and how is it recognised?

As discussed on Page I 25, when the body has too little insulin for its needs, fat is used to provide energy instead of carbohydrate. Ketones are produced, which are acidic and poison the body. If large amounts of ketones are made the situation can worsen dramatically. This dangerous situation is known as **Diabetic Ketoacidosis**, or “DKA”. Features of ketoacidosis include:

### The common symptoms of Ketoacidosis are:

- High blood sugar results (usually)
- Urine ketone results “moderate” or “large” OR
- Blood ketone results 1 mmol/l or higher
- Dehydration
- Vomiting
- Abdominal pain
- Rapid breathing rate
- Sweet smelling breath
- Increasing sleepiness/drowsiness, lack of energy

## What usually happens to someone in ketoacidosis?

Extra insulin is needed to stop ketones being made during ketoacidosis. Insulin often has to be given directly into a vein using a “drip”. Ketones may cause abdominal pain, vomiting, and affect the normal function of the gut, and so taking fluids by mouth can make a bad situation even worse. Large volumes of fluid are given into the vein, along with insulin, correcting the dehydration that also occurs.

**Ketoacidosis is extremely dangerous**, and should never be taken lightly. At best it needs careful medical review, and admission to hospital is likely. Severe cases may need intensive care. Severe ketoacidosis can cause permanent brain injury, and may be life-threatening.

“Sick Day Rules” aim to increase insulin doses safely before ketones can poison the body. Hopefully at this stage **ketoacidosis** can be prevented. Everyone in the family should know when and how to use the Sick Day Guidelines (Page G 07), and the hospital can be called if any more information is needed. **Extra insulin when ill may prevent the need to come into hospital** for treatment.

When most people are first diagnosed with diabetes, they have the basic symptoms of thirst, passing urine more often, feeling tired and losing weight. Some, however, arrive at hospital very unwell, already in ketoacidosis. Features include **abdominal pain, dehydration, vomiting, drowsiness, breathing rapidly or with deep breaths, sweet-smelling breath, or drowsiness**. This is an emergency situation, and needs urgent hospital treatment with insulin and extra fluids.

Ketoacidosis at diagnosis does not mean someone’s diabetes is more severe - it can happen to *anyone* with Type 1 diabetes. It simply shows there has not been enough insulin present to prevent ketones forming. This also means someone who is *not* very unwell at diagnosis has just as much chance of developing ketoacidosis at some stage when they are older as someone needing urgent admission. They may still become very unwell if they do not have the right amount of insulin for their body’s needs.

## Some common causes of ketoacidosis

The best way to prevent ketoacidosis occurring is to look after diabetes well. If eating healthily and adjusting insulin doses regularly, even during times of illness and stress ketoacidosis is unlikely to occur. Ketones may be made, but the situation rarely progresses to the more serious ketoacidosis.

If diabetes control is good ... ketoacidosis is much less likely to occur ...

Ketoacidosis may happen at the time of first diagnosis, but it is also likely to develop during illness - a vomiting illness or a chest infection, for example. Problems are unlikely if someone's HbA1c is lower than 8%, but the risk of ketoacidosis increases as diabetes control worsens. If a person's HbA1c is 10% or higher, the risk becomes very high indeed, and a simple cold may be enough to cause ketoacidosis.

While everyone forgets to take an insulin injection at one time or another, many young people deliberately miss insulin injections. One study in Scotland showed that **two thirds of teenagers regularly and deliberately missed one or more injections** every day. This means missing insulin is actually *normal* in this age group, although clearly it is not a good way to remain healthy. It certainly increases the risk of ketoacidosis, and is probably the main reason young people with diabetes are admitted to hospital.

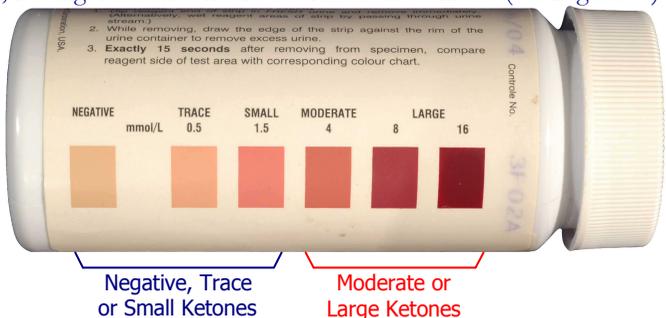
... continued parental involvement in diabetes care remains very important.

There are many reasons young people find it difficult to take all their insulin. Some find injections and testing glucose boring, and some find them embarrassing in front of their friends. Others feel badly about the situation, and themselves, when day after day they find high blood glucose results. It may seem easier not to face up to the fact they have a life-long medical condition, and so many deliberately miss some insulin injections altogether. This is dangerous, as ketoacidosis and longer-term complications are much more likely to occur. Even though many teens wish to be fully independent, continued parental involvement in diabetes care remains very important.

### Testing for ketones in urine or blood

Ketostix are used to test for ketones in urine, and a special ketone meter can be used to test for ketones in blood. If unwell or blood glucose 14 mmol/l and above, testing for ketones is essential. A urine result of moderate-large ketones, or a blood ketone result over 1.0 mmol/L, is dangerous and should be treated the same as (see Page G07)

1. Dip test strip in fresh urine sample and remove at once
2. Draw edge of strip against container rim to remove urine.
3. At 15 seconds compare strip colour with chart on side of Ketostix bottle.
4. Use "sick day rules" if moderate or large



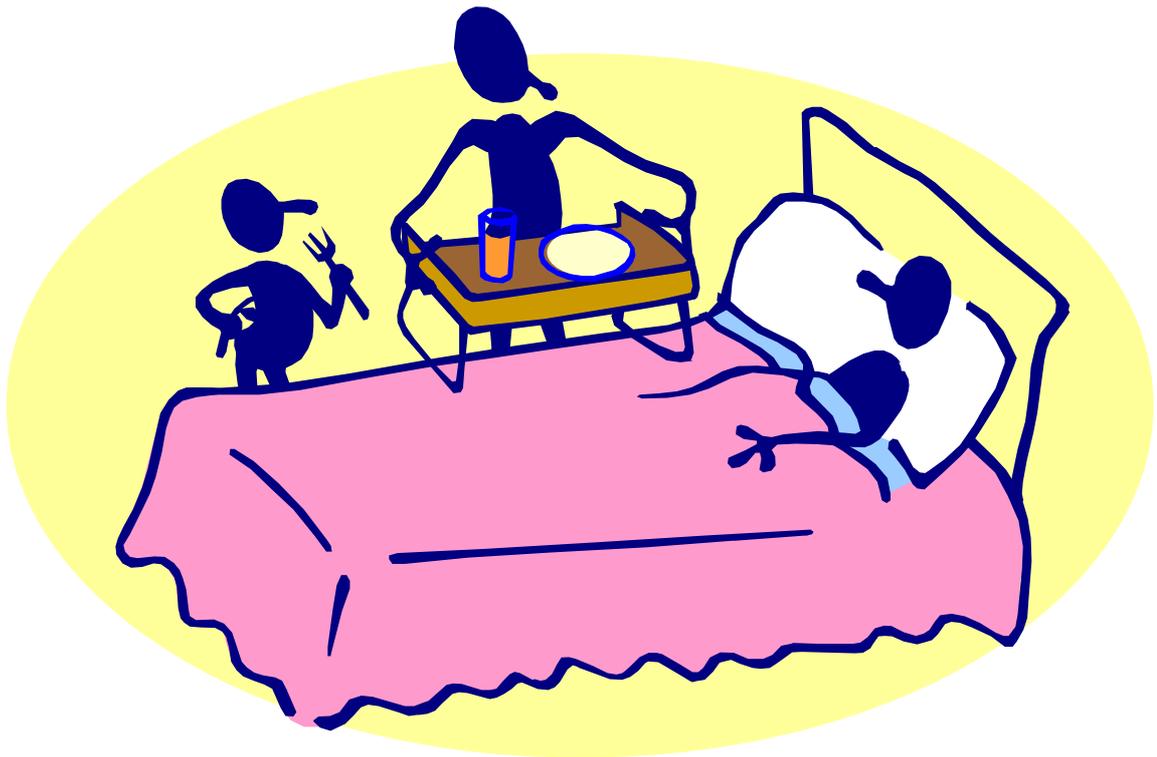
NEVER DELAY using Sick Day Guidelines (Page G 07) or seeking advice.

Ketones are a danger sign - Always call if situation not improving, or if worried at any time..

# Illness

At some stage, most children will get colds, sore throats, viruses, tummy bugs and vomiting illnesses. There is no reason why a child with diabetes should become unwell any more often than a child without the condition, but having diabetes certainly won't prevent you from catching the usual childhood illnesses.

Illness will probably affect blood glucose results and your appetite. The body responds to the stress of illness by increasing the amount of glucose in the blood. The body's metabolic rate increases, and therefore so does its need for an adequate energy supply. Normally the pancreas gland would simply produce more insulin in this situation, but for someone with diabetes, they have to increase the insulin amount themselves, by injecting increased doses.



Without an increase in the amount of insulin injected during illness, the body will be unable to use carbohydrate properly, and so will start to use its alternative energy supply – fat. This only provides a short term solution, as the result of using fat as an energy source is that ketones are produced. These acids steadily poison the body, making the person with diabetes even more ill, and only insulin will halt this situation developing.

Care must be taken at a time of illness, however, as during a vomiting illness or if the child has diarrhoea, the blood glucose may fall, even as the body continues to produce ketones from the consumption of fat. In this situation, and at any time someone with diabetes becomes ill, it is essential to check blood glucose results frequently, and also to test the urine for ketones. Keep a record of these results and follow “The Sick Day Rules” advised by your team.

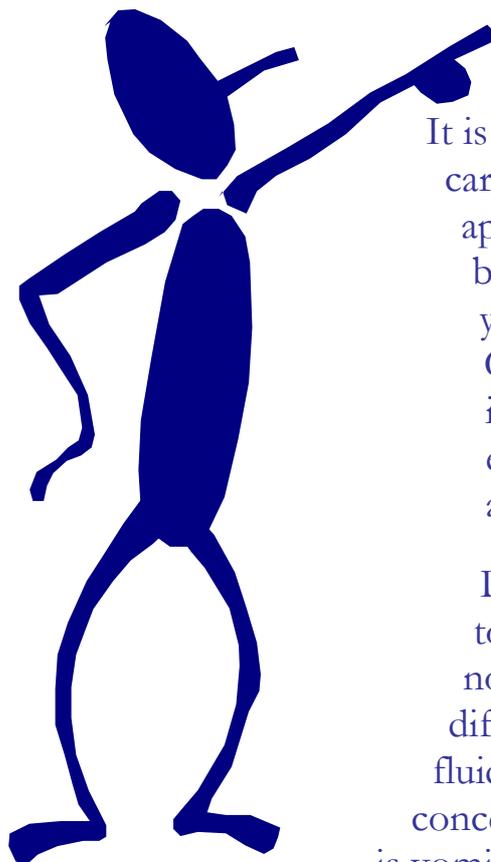
Seek advice from the Diabetes Team whenever you are uncertain or concerned in any way.

**Do not wait for the Diabetes to get out of control.**

**What to do...**

Remember the golden rule:

**Never stop insulin AND Never stop carbohydrate**



It is important to **always** have insulin and carbohydrate every day, even during illness when appetites are poor and even if you are on basal bolus insulin regimen. As mentioned above, you usually need **more** insulin during illness. Carbohydrate is needed to stop the body using its fat stores as a source of energy, and is essential to prevent the formation of ketone acids.

During minor illnesses, the usual diet may be tolerated but if the child feels unable to eat as normal, carbohydrate will need to be given in a different form – simple, sugary carbohydrates or fluids. A vomiting illness can be a real cause for concern. Contact your Diabetes Team if the child is vomiting to the extent that all fluids are being brought back.

**Remember, always seek medical advice if you are in any way concerned.**

## Can't face food?

If usual foods cannot be eaten, replace the usual carbohydrate amount in the diet with sugary carbohydrates or fluids that will be more easily tolerated.

Here are some ideas for providing 10g portions of carbohydrate:

Items providing 10 g of Carbohydrate	Amount required
• Lucozade	50 mls/2oz
• Fruit juice -orange/apple	½ glass/100mls
• Coke-not diet	½ glass/100mls
• Other fizzy drinks	1 cup/150mls
• Milk	1 cup/ 200mls
• Glucose tablets	3 tablets
• Blackcurrant drink eg Ribena	1 tablespoon undiluted
• Ice lollies	Check label
• Ice cream	1 scoop
• Fruit yogurt- not diet	½ pot
• Sweetened milk pudding	2 oz
• Boiled sweets	2
• Thick soup	1 ladle
• Jelly (not sugar free)	3 level tablespoons
• Sugar, jam, honey or syrup	2 teaspoons

## Tips

- **Sugary foods and drinks** may be necessary to ensure sufficient carbohydrate is taken.
- Many children **prefer to drink** than eat when unwell.
- If fluids are all that can be managed, sip them slowly throughout the day - **little and often** is best.
- Let the **gas go out of fizzy drinks** as it may upset the stomach further.
- Encourage **low calorie/sugar free drinks** including water, *in addition* to any fluids used to provide carbohydrates. This prevents dehydration, and will help to “flush out” ketones and excess sugar.
- **Never cut down on carbohydrate** but if you feel unable to eat your usual meals and snacks divide the total daily carbohydrate into 10g portions spread throughout the day.