NHS
University Hospitals Birmingham
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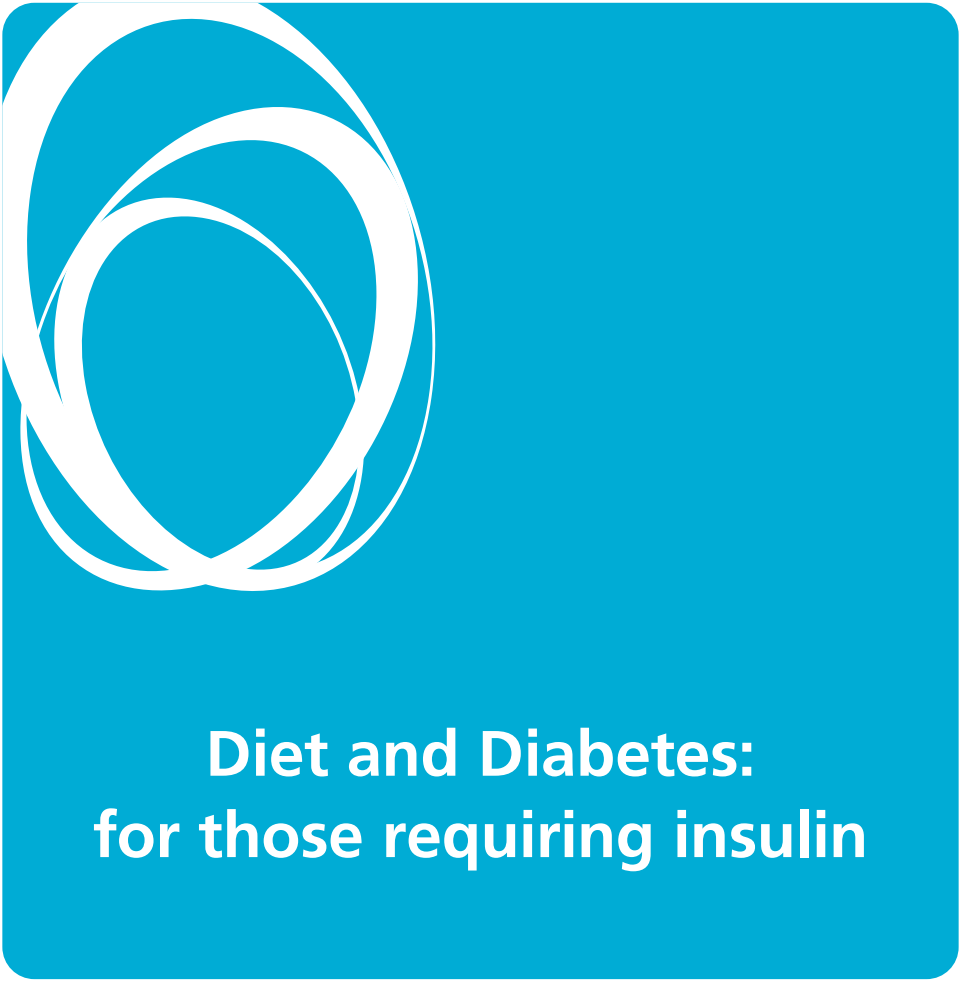


Diet and Diabetes: for those requiring insulin

Building healthier lives

UHB is a no smoking Trust

Diabetes mellitus (often shortened to diabetes) is a condition whereby the body is unable to make enough, or respond properly to, a hormone called insulin. Insulin helps blood glucose (sugar) enter our body cells to be used as energy – without insulin, blood glucose levels rise above normal. There are many different types of diabetes (ask your Diabetes Healthcare Team), but the two main types are:

Type 1 diabetes is when no insulin is produced because the insulin-producing cells in the pancreas no longer work. This type of diabetes is always treated with injections of insulin.

Type 2 diabetes is when the body either does not produce enough insulin, or the insulin it produces does not work as well as it should (insulin resistance). There are more treatment options for those with Type 2 diabetes.

Lifestyle changes such as following a balanced diet, increasing physical activity, and weight control are especially important in managing Type 2 diabetes, however as the pancreas becomes weaker the body requires more support to control blood glucose levels. Insulin is often needed.

Diabetes medications

Many different types of diabetes medications are available; these can be prescribed on their own or in combination as each medication works in a different way to lower blood glucose levels. You may remain on some of your previous diabetes medications even whilst taking insulin as they may work in a different way to lower blood glucose levels. Insulin acts more aggressively than other diabetes medications to lower your blood glucose levels increasing the risk of low blood glucose levels (hypoglycaemia/'hypo').

Please see separate 'Why do I sometimes feel shaky, dizzy and sweaty' leaflet given to you by your diabetes nurse.

Insulin

There are many different types of insulin available, each with advantages/disadvantages. You and your diabetes team will discuss which is most appropriate for you.

Long-acting/basal insulin

These may be given once or twice daily along side an oral medication or quick-acting insulin. They work best if taken at a regular time and do not need to be taken with food. Long-acting/basal insulin for example Lantus, Toujeo, Abasaglar, Semglee or Tresiba.

Intermediate insulin

These are similar to long-acting insulin but need to be taken with carbohydrate at a regular time. Intermediate insulin for example Insulatard and Humulin I.

Quick-acting/bolus insulin

These are used alongside intermediate OR long-acting insulin and must be taken at mealtimes/with carbohydrate. Quick-acting/bolus insulin for example Novorapid, Humalog, Apidra or Fiasp.

Pre-mixed insulin

These are commonly given two or three times daily – they contain a mix of insulin and work best for those who follow a regular meal pattern/lifestyle (i.e breakfast, lunch and evening meal). Pre-mixed insulin for example Humalog Mix 25, Humalog Mix 50, Novomix 30.

Fig 1; Long-acting insulin

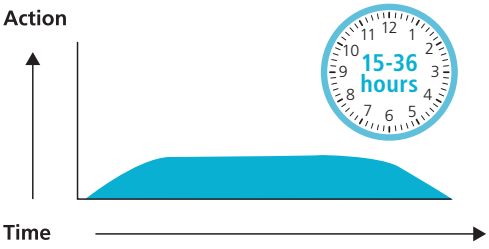


Fig 2; Intermediate-acting insulin

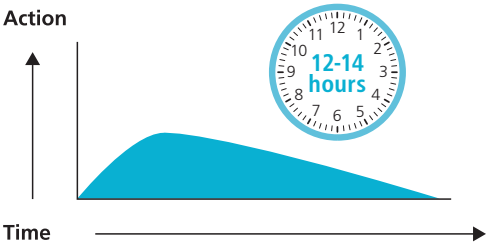


Fig 3; Quick-acting insulin

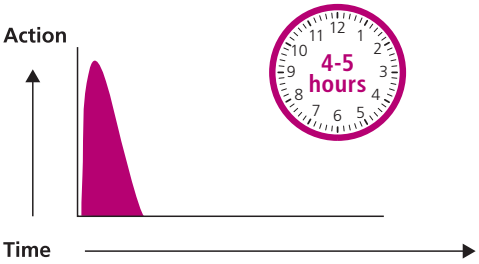
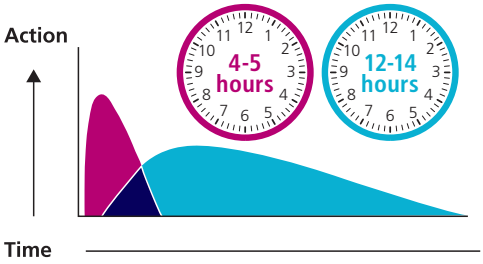


Fig 4; Pre-mixed insulin



Which foods affect my blood glucose level?

Most of us eat different foods every day. It is important to have variety in your diet to get the many different vitamins and minerals we need. A balanced diet should contain food from each of the three main nutrients: (See Eatwell diagram)

- Carbohydrates (CHO) are important as they provide our bodies with energy needed to function. Insulin helps the blood glucose enter our body's cells to be used as energy however; eating carbohydrate in excessive amounts can increase blood glucose levels and affect weight management. For examples of CHO see page 7.
- Protein foods help with tissue repair and muscle strength. However, eating more than you need will lead to weight gain.
- Fat provides some essential vitamins, but is only needed in very small amounts in your daily diet. Too much will lead to weight gain and increases your risk of complications including those from diabetes, heart disease and stroke.

Eatwell Guide

Use the Eatwell Guide to help you get a balance of healthier and more sustainable food. It shows how much of what you eat overall should come from each food group.

Check the label on packaged foods

Each serving (150g) contains

	Energy	Fat	Saturates	Sugars	Salt
	1046kJ 250kcal	3.0g	1.3g	34g	0.9g
		LOW	LOW	HIGH	MED
	13%	4%	7%	38%	15%

of an adult's reference intake

Typical values (as sold) per 100g: 697kJ/ 167kcal

Choose foods lower in fat, salt and sugars

Eat at least 5 portions of a variety of fruit and vegetables every day

Fruit and vegetables

Raisins

Chopped tomatoes

Frozen peas

Choose wholegrain or higher fibre versions with less added fat, salt and sugar

Potatoes, bread, rice, pasta and other starchy carbohydrates

Potatoes

Whole grain cereal

Cous Cous

Porridge

Whole wheat pasta

Bagels

Rice

Spaghetti

Beans, pulses, fish, eggs, meat and other proteins

Lentils

Beans lower salt and sugar

Tuna

Plain nuts

Chick peas

Lean mince

Eat more beans and pulses, 2 portions of sustainably sourced fish per week, one of which is oily. Eat less red and processed meat

Dairy and alternatives

Low fat soft cheese

Semi skimmed milk

Soya drink

Plain Low fat Yoghurt

Choose lower fat and lower sugar options

Oil & spreads

Choose unsaturated oils and use in small amounts

Sauce

Crisps

Eat less often and in small amounts

6-8 a day

Water, lower fat milk, sugar-free drinks including tea and coffee all count.

Limit fruit juice and/or smoothies to a total of 150ml a day.

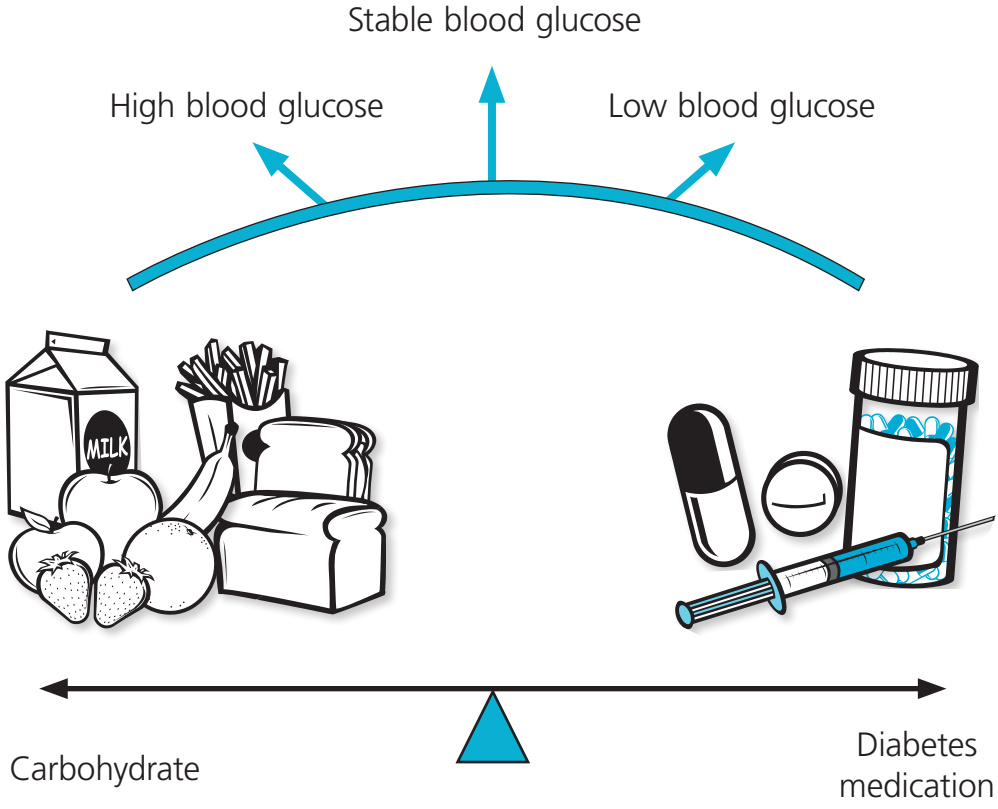
Per day 2000kcal 2500kcal = ALL FOOD + ALL DRINKS

Source: Public Health England in association with the Welsh Government, Food Standards Scotland and the Food Standards Agency in Northern Ireland

Carbohydrate and diabetes

Foods that contain starch and sugar are collectively called carbohydrates. When digested, these foods are broken down to glucose and absorbed into the bloodstream.

Carbohydrates are important as they provide our bodies with energy needed to function. For people with diabetes, eating large amounts of these foods will increase blood glucose levels because there is not enough insulin working in your body.



What can I do to help my blood glucose levels?

Whilst there is no 'special diet' to follow, there are a number of small changes you can make. These are changes to the Timing, Amount & Type of carbohydrate you choose to eat.

Timing – Spread carbohydrate through out the day

Eating regular meals spreads the carbohydrate load across the day. This reduces the amount of glucose released into your blood at one time.

Amount–Eat regular, consistent portions of carbohydrate at mealtimes

All carbohydrate foods are digested and absorbed into the blood as glucose – the more you eat the greater the effect on your blood glucose level.

For example, you might normally have one slice of toast at breakfast but today you feel hungry so you have a bowl of cereal and two slices of toast. Today, your blood glucose level will be higher because you have eaten more carbohydrate.

Eating similar portion sizes of carbohydrate at each mealtime helps to keep your blood glucose level more stable and helps your Diabetes Team to prescribe the correct dose of medication.

Do NOT be tempted to cut out carbohydrate completely, insulin (and some tablets) require you to have carbohydrate at mealtimes to minimise the risk of you having a low blood glucose level (hypoglycaemia or 'hypo').

Type – choose carbohydrate foods that are broken down slowly

When you feel that you are eating the correct amount of carbohydrate, you may wish to look at the type. Different types of carbohydrate are digested at different speeds and so changes how quickly they may affect

your blood glucose level; this is also called the Glycaemic Index (GI).

Lower GI foods are slower to raise blood glucose levels which allows your body to handle to glucose more efficiently. They are also often higher in essential nutrients such as fibre, vitamins & minerals.

1. Starchy CHO	2. CHO as fructose	3. CHO as lactose	4. CHO in snacks
These foods often form the basis of meals, for example:	Whether dried or fresh, fruit contains natural sugar, for example:	Liquid dairy products contain milk sugar (lactose), for example:	These products often have large amounts of added sugar and fat, for example:
Wholegrain cereals (All Bran, coarse porridge), Potatoes/ Sweet potato, Granary/Seeded/ Rye breads, Wholegrain pasta , Basmati rice.	**Apples, oranges, raisins, strawberries, mangos.**	**Milk, yoghurts, ice cream, crème fraiche, fromage frais.**	**Sugar, honey, sugary drinks, sweets, fruit juices, crisps, biscuits, chocolate.**
These are an important part of a balanced, varied diet as they provide 'slow release' energy, fibre, vitamins and minerals.	These are an important part of a balanced, varied diet as they provide essential fibre, vitamins and minerals.	These are an important part of a balanced, varied diet as they provide essential vitamins and minerals.	If eaten regularly they may cause weight gain/ erratic blood glucose control – avoid these foods where possible.

Fat and diabetes

Having diabetes is a risk factor for heart disease and other conditions and being overweight increases your risk further. Eating as little fat as possible and choosing 'healthier' fats will help with weight control and reduce your risk of complications.

Saturated fat (Such as butter, lard, fat on meat and in cakes and pastries)	**Polyunsaturated fat** (Such as plant-based oils and spreads)	**Monounsaturated fat** (Such as olive and rapeseed oils and spreads)	**Omega-3** (Such as salmon, trout and fresh tuna)
✗ High energy ✗ Too much can cause weight gain ✗ Can increase cholesterol levels ✗ More then 5g per 100g is **HIGH**	✗ High energy ✗ Too much can cause weight gain	✗ High energy ✗ Too much can cause weight gain	
✓ Swap to other fats where possible ✓ Choose reduced fat options ✓ Limit these foods to treats eaten occasionally ✓ Do not add any extra fat ✓ Less than 1.5g per 100g is **LOW**	✓ Swap to mon-ounosaturated fat where possible ✓ Choose reduced fat options ✓ Do not add any extra fat	✓ Choose reduced fat options e.g. olive oil based spread ✓ Do not add any extra fat ✓ Use rapeseed/ ground nut oil for cooking and olive oil for dressings	✓ Choose oily fish ✓ Vegetarian sources include linseed/flaxseed

Protein and diabetes

Where possible choose lean/low fat sources of protein – aim to have two small portions daily.

Meat, poultry and eggs	Fish	Milk and dairy	Beans pulses, nuts and seeds
✓ Good source of iron	✓ Oily fish contain omega-3; important for heart health ✓ White fish lower in fat	✓ Good source of calcium	✓ Good vegetarian source of protein ✓ Contains monosaturated fat; better for heart health ✓ Good source of fibre
Suggestions: • Choose lean cuts of meat • Keep portion sizes to 2-3 oz (50-75g) • Trim off excess fat • Remove skin from poultry • Avoid adding fat – grill/steam/ poach/boil instead • Limit eggs to 1 per day	**Suggestions:** • Aim for 2 portions a week – include 1 portion of oily fish Oily fish include mackerel, sardines, salmon, trout, fresh tuna	**Suggestions:** • Choose low fat varieties • Milk and other 'liquid' dairy will contain carbohydrates too and will affect your blood glucose level	**Suggestions:** • Avoid varieties with added salt • Some beans and pulses will contain carbohydrate but normally will not affect your blood glucose level • Be aware that the sauces that these foods often come in may contain sugar and will affect your blood glucose level

Alcohol and diabetes

Unless advised by your doctor, there is no reason to completely avoid alcohol because of your diabetes. Alcoholic drinks do contain varying amounts of alcohol and carbohydrate so will affect your weight and may also affect your blood glucose levels.

There are no 'safe' limits, it is recommended that you keep your alcohol intake to less than 14 units per week.

It is also recommended that if you are drinking up to 14 units of alcohol, this should be spread over the week.

Units can be difficult to understand as most people drink by the glass, not by the unit.

2 Units

182 calories
3.5% ABV

1 Unit

120 calories
37.5% ABV

1 Unit

55 calories
40% ABV

1.5 Units

93 calories
125ml
12% ABV

2.1 Units

130 calories
175ml
12% ABV

9 Units

556
calories
12% ABV

1.4 Units

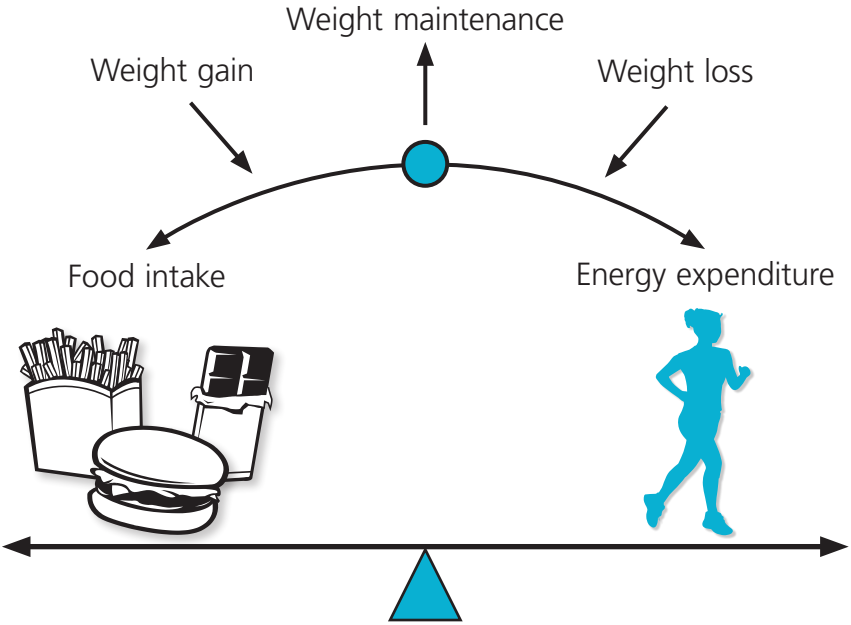
200
calories
5% ABV

If you take any of the medications which increase your risk of hypo, you should take the following precautions if drinking more than three units of alcohol

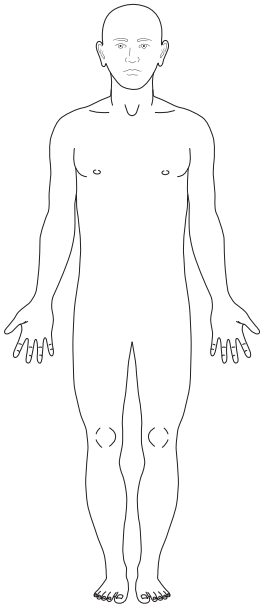
- Drink with meals, **not** on an empty stomach
- Do not skip your usual meal or cut down your carbohydrate intake
- Have a small carbohydrate containing snack before bed if drinking in the evening such as a slice of toast or a small bowl of cereal

Body weight and diabetes

Eating/drinking provides energy which is used to perform everyday activities such as breathing and walking; any energy not used is stored in the body as fat. The more fat stored, the less effective insulin becomes resulting in higher blood glucose levels.



Measuring your waist and estimating your Body Mass Index (BMI) can help identify if you are at risk of secondary complications. The greater your waist size and/or BMI the greater the risk you are at.



To measure your waist

- Find the top of your hip bone
- Find your lowest rib
- Measure in between these points making sure the tape measure is kept level with the floor and not pulled too tight

		At risk
Men	White European	>90cm (>35inches)
	Black, Asian and other minority ethnic groups*	>94cm (>37inches)
Women	White European	>80cm (>32inches)
	Black, Asian and other minority ethnic groups*	>80cm (>32inches)

*these groups are known to have an increased risk of diabetes

To estimate your BMI

Use the table on page 14:

1. Find your weight along the top of the table
2. Find your height along the side of the table
3. Follow along the column and row; where they meet is an estimation of your BMI

E.g. For an individual of 175cm, weighing 85kg; BMI = 27.8kg/m2

Activity and diabetes

Keeping physically active is important for everyone, not just for those with Diabetes as it improves/maintains your general health. If you are not usually active or have any other health conditions, please discuss this with your Consultant/GP before starting. If you are currently not able to manage 30mins in one go, start slowly and gradually increase your activity.

Weight in kilograms

Height in centimetres	45	48	50	53	55	58	60	63	65	68	70	73	75	78	80	82.5	85	87.5	90
145.0	21.4	22.6	23.8	25.0	26.2	27.3	28.5	29.7	30.9	32.1	33.3	34.5	35.7	36.9	38.0	39.2	40.4	41.6	42.8
147.5	20.7	21.8	23.0	24.1	25.3	26.4	27.6	28.7	29.9	31.3	32.2	33.3	34.5	35.6	36.8	37.9	39.1	40.2	41.4
150.0	20.0	21.1	22.2	23.3	24.4	25.6	26.7	27.8	28.9	30.0	31.1	32.2	33.3	34.4	35.6	36.7	37.8	38.9	40.0
152.5	19.3	20.4	21.5	22.6	23.6	24.7	25.8	26.9	27.9	29.0	30.1	31.2	32.2	33.3	34.4	35.5	36.5	37.6	38.7
155.0	18.7	19.8	20.8	21.9	22.9	23.9	25.0	26.0	27.1	28.1	29.1	30.2	31.2	32.3	33.3	34.3	35.4	36.4	37.5
157.5	18.1	19.1	20.2	21.2	22.2	23.2	24.2	25.2	26.2	27.2	28.2	29.2	30.2	31.2	32.2	33.3	34.3	35.3	36.3
160.0	17.6	18.6	19.5	20.5	21.5	22.5	23.4	24.4	25.4	26.4	27.3	28.3	29.3	30.3	31.3	32.2	33.2	34.2	35.2
162.5	17.0	18.0	18.9	19.9	20.8	21.8	22.7	23.7	24.6	25.6	26.5	27.5	28.4	29.3	30.3	31.2	32.2	33.1	34.1
165.0	16.5	17.4	18.4	19.3	20.2	21.1	22.0	23.0	23.9	24.3	25.7	26.6	27.5	28.5	29.4	30.3	31.2	32.1	33.1
167.5	16.0	16.9	17.8	18.7	19.6	20.5	21.4	22.3	23.2	24.1	24.9	25.8	26.7	27.6	28.5	29.4	30.3	31.2	32.1
170.0	15.6	16.4	17.3	18.2	19.0	19.9	20.8	21.6	22.5	23.4	24.2	25.1	26.0	26.8	27.7	28.5	29.4	30.3	31.1
172.5	15.1	16.0	16.8	17.6	18.5	19.3	20.2	21.0	21.8	22.7	23.5	24.4	25.2	26.0	26.9	27.7	28.6	29.4	30.2
175.0	14.7	15.5	16.3	17.1	18.0	18.8	19.6	20.4	21.2	22.3	22.9	23.7	24.5	25.3	26.1	26.9	27.8	28.6	29.4
177.5	14.3	15.1	15.9	16.7	17.5	18.3	19.0	19.8	20.6	21.4	22.2	23.0	23.8	24.6	25.4	26.2	27.0	27.8	28.6
180.0	13.9	14.7	15.4	16.2	17.0	17.7	18.5	19.3	20.1	20.3	21.6	22.4	23.1	23.9	24.7	25.5	26.2	27.0	27.8
182.5	13.5	14.3	15.0	15.8	16.5	17.3	18.0	18.8	19.5	20.3	21.0	21.8	22.5	23.3	24.0	24.8	25.5	26.3	27.0
186.0	13.1	13.9	14.6	15.3	16.1	16.8	17.5	18.3	19.0	19.7	20.5	21.2	21.9	22.6	23.4	24.1	24.8	25.6	26.3
187.5	12.8	13.5	14.2	14.9	15.6	16.4	17.1	17.8	18.5	19.2	19.9	20.6	21.3	22.0	22.8	23.5	24.2	24.9	25.6
190.0	12.5	13.2	13.9	14.5	15.2	15.9	16.6	17.3	18.0	18.7	19.4	20.1	20.8	21.5	22.2	22.9	23.5	24.2	24.9

Underweight | Normal | Overweight | Obese

Activity can take many forms and does not just apply to sport, for example;

- House work
- Dancing
- Painting & decorating
- Walking & hiking
- Dancing
- Sex

Aim to be active for at least 30mins every day - by being more active, less energy needs to be stored in the body as fat which may;
Improve response to insulin

- Reduce stress levels
- Help control weight
- Improve heart health
- Improve how you look/feel

Generally, during activity the body uses blood glucose as an energy source which may lower blood glucose levels. During times of increased activity, the body can use blood glucose more quickly. Therefore you should always consider;

- Carrying rapid acting carbohydrate
- Monitoring blood glucose levels before, during & after activity
- When you last injected insulin

Guide to adjusting for physical activity

All activity/exercise will affect blood glucose (BG) levels - it may not be easy, but the good news is that with the right guidance and support you can learn to safely manage your BG levels around your chosen activity. For people with diabetes treated with insulin, the risk of hypoglycaemia is increased both during and in the hours following activity. The risk of hypoglycaemia can be reduced by;

- Increasing the amount of carbohydrate consumed and/or
- Reducing the amount of insulin injected (this is dependent on the type of insulin you take)

If you are planning to start exercising regularly or are working towards a sporting event please speak to the Diabetes Team about how to manage your BG levels before, during & after exercise.

Illness and diabetes

If you are feeling unwell your blood glucose levels may become raised – this is a normal response and can happen even though you are eating less or vomiting.

- **Never** stop taking your regular insulin unless advised by your GP or diabetes team as you may need more insulin during times of stress, illness, surgery and trauma
- Check your blood glucose levels regularly (before usual mealtimes/ before bed)
- If you have been taught, check your ketone levels
- Sip sugar-free fluids (aim for 100ml every hour)
- Try to continue your usual meal pattern; you may find plain food easier to tolerate such dry toast or cereal or milk

If any of the following apply to you, you need to contact your GP/ diabetes team/nearest A&E department:

- Unable to tolerate fluids
- Persistent raised blood glucose levels
- Persistent vomiting
- Positive for ketones
- Persistent diarrhoea
- Unsure/need support

Driving and diabetes

Your responsibilities if driving are to:

- Notify the DVLA and your insurance company that you are on insulin
- Keep glucose treatments and carbohydrate snacks in the car within easy reach
- Check your blood glucose levels and ensure they are above 5mmol/L before driving

If you have a hypo whilst driving you should:

- Stop the car as soon as possible
- Remove the keys to demonstrate you are not in charge of the car, and move into the passenger seat if safe to do so
- Treat the hypo as advised in the 'Why do I sometimes feel shaky, dizzy and sweaty' leaflet given to you by your diabetes nurse
- You should not drive for at least 45 minutes after recovery as your response time will be slower

Insulin passports

It is recommended you should always carry identification detailing your condition and treatment. Speak to your diabetes healthcare team about an insulin passport.

Please use the space below to write down any questions you may have and bring this with you to your next appointment.

For further information/advice contact

Queen Elizabeth Hospital Birmingham
Nutrition & Dietetics Department
Telephone: **0121 371 3485**

Heartlands Hospital, Solihull Hospital and Good Hope Hospital
Diabetes Dietitians
Telephone: **0121 424 3146**

Solihull Community Diabetes Service
Telephone: **0121 770 4432**

If you require this information in another format, such as a different language, large print, braille or audio version please ask a member of staff or email **interpreting.service@uhb.nhs.uk**.

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