The Dudley Group
NHS Foundation Trust

Type 1 Diabetes and Carbohydrate (carb) counting

Nutrition and Dietetics

Patient Information Leaflet

Healthy eating with Type 1 diabetes

There is no special diet for individuals with Type 1 Diabetes. Instead, a healthy balanced diet suitable for the rest of the population is advised.

There is no need for diabetic foods.

Also, there is no need to avoid all sugar, but it is advised to opt for sugar-free drinks and using sweetener instead of sugar on food and drinks unless treating hypoglycaemia (blood glucose less than 4mmol/L).

Carbohydrate (carb) counting is the best way to ensure your blood glucose levels are maintained in the target range. It also allows flexibility with your food choices which can be matched with correct doses of mealtime/bolus insulin.

Steps to Carb counting

Step 1 - Identify carb foods in your meal to “count”

Step 2 - Work out the amount of carbs in grams (g) in your portion

Step 3 - Decide how many units of mealtime/bolus insulin to give

Step 1 - Identify carb foods in your meal to "count"

What to "count"

All carb foods are broken down into glucose which is released into the blood. The amount of carb eaten is the most important factor when considering the impact of food or drink on your blood glucose levels.

It is advised to "count" the foods in the below table:

CARBOHYDRATES		
Starchy Foods	Foods containing sugar	
	Simple sugars	Natural sugars
Bread/cobs/rolls Rice Crackers Potatoes (chips & crisps) Pasta Breakfast cereals Anything made with flour Chapatti/Naan/Roti Couscous Pastry (pies, sausage rolls) Yam Fufu Plantain Eba/Gari Coating – breaded/batter Baked beans Parsnips Peas Sweetcorn	Sugar Jam Fizzy drinks Sweets Cakes Biscuits Desserts Chocolate Jar sauces Sauces (ketchup/brown/BBQ) Tinned spaghetti Fruit juice and smoothies Honey Maple Syrup Baked beans	Milk Yoghurt All fruit

It is advised to count the milk in meals e.g. cereal, but milk in hot drinks between meals does not need to be counted.

What to not count

You do not need to count any food which is just protein or fat. There is no need to count meat, fish, eggs, cheese, oils or spreads. However, if these foods have a breaded or battered coating (e.g., fish fingers, breaded cheese bites) you would need to "count" the carbs in them.

You will notice that some vegetables are in the table above under starchy carbohydrates and need to be counted. All other vegetables and salad items do not need to be counted as they generally have very low amounts of carbs.

Step 2 - Work out the amount of carbs in grams (g) in your portion

It is useful to use a set of digital weighing scales when starting out and make a note in a book or on your fridge of the grams of carbohydrates in your typical meals. Once you are familiar with your typical portion size you can use household measures e.g., cups, plates, spoons and bowls to measure the portion out day-to-day without having to weigh every time.

If the packaging is available, it is always best to look at the carbohydrate values on this as it is specifically for that product. Make sure you look at total "Carbohydrate" (circled below) and not just "of which sugars" or "of which starch". "Carbohydrate" includes "of which sugars" in its total. "Carbohydrate" is always found on the back of packaging. It is useful to find the carbohydrate per 100g value to use for the calculations.

<u>To calculate the carbohydrate (g) in your portion:</u>

Using the amount of carbohydrate (g) per 100g, divide this number by 100 (as the product weighs 100g). Then next multiply this answer by the weight of your portion (g).

$$\frac{\text{Carbs per 100g (g)}}{\text{(Divided by) } 100} \times \text{Weight of your serving (g)}$$

<u>Example</u>

Bran flakes	**Per 100g**
Energy	359kcal
Protein	12g
Carbohydrate	65g
of which sugars	14g
Fat	2.6g

If you measured your bran flakes portion as 45g.

65 / 100 = 0.65

0.65 X 45g = 29.25g (round to nearest 1g)

So **29**g carb in your 45g serving of bran flakes.

If you have milk on your bran flakes you need to “count” that also.

Semi-skimmed milk	**Per 100ml**
Energy	50kcal
Protein	3.6g
Carbohydrate	4.8g
of which sugars	4.8g
Fat	1.8g

If you measure out that you have 150ml milk….

4.8 / 100 = 0.048

0.048 x 150 = 7.2g carbs (round to nearest 1g)

= **7g** carbs

Bran flakes carbs added to milk carbs = **29 + 7 = 36g carbs**

Cooked vs. dried

Cooked and dried varieties of certain foods will weigh differently due to absorbing or losing water during cooking. Therefore, it is important to make sure you are looking at the correct value depending if your food is cooked or uncooked.

It is advised to weigh pasta and rice cooked (highlighted in **bold** below). The carbs per 100g for cooked and uncooked pasta and rice are shown in the table below.

Carbohydrate food	Carbs (g) per 100g
White rice (cooked)	**30**
White rice (uncooked)	86
Brown rice (cooked)	**32**
Basmati rice (cooked)	**30**
White pasta (cooked)	**22**
White pasta (uncooked)	74
Wholemeal pasta (cooked)	**23**

Example

You weigh your cooked portion of wholemeal pasta on your plate at 165g.

23/ 100 = 0.23

0.23 x 165 = 39.95 (round to nearest 1g)

40g of carbs in your serving

Eating out/takeaways

Carbohydrate reference tables are also useful as are supermarket and restaurant websites and books and apps, such as “Carbs and Cals”, My Fitness Pal. These can be particularly useful when having takeaways or eating out where packaging is not available and your “best guess” may have to be made. Avoid giving your mealtime insulin before the meal arrives on these occasions in case for some reason it is delayed and your insulin works before it comes, putting you at risk of hypoglycaemia.

Step 3 - Decide how many units of mealtime/bolus insulin to give

To decide how many units of your mealtime/bolus insulin (for example, Apidra, Fiasp, Humalog, NovoRapid) will cover, you need to consider your insulin: carb ratio and whether you need a correction dose added to this.

Insulin: carb ratios

Your ratio advises how many grams of carbohydrate 1 unit of your mealtime insulin will cover.

For example, 1:10 suggests that 1 unit of mealtime insulin will cover 10g of carbohydrate. The number on the right-hand side of your ratio is your “special number”. To work out how many units of mealtime insulin to give, divide your total carbs in your meal by this special number. For example, if my meal total is 80g of carbohydrate: 80 divided by 10 = 8 units.

Insulin sensitivity factor (ISF)

You Insulin sensitivity factor (ISF), otherwise known as correction or adjustment dose, describes an optional extra to the units of your mealtime insulin for your carbohydrate. It is only to be given if your blood glucose level before a meal is above target. Do not give a correction dose between meals unless you have blood ketones.

Targets should be individualised for everyone. However, it is generally advised that when starting carbohydrate counting you aim to correct your blood glucose levels to 5-7mmol/L before each meal and 7-8mmol/L at bed.

Your correction or insulin sensitivity factor (ISF) will describe how much 1 unit of your mealtime insulin reduces your blood glucose levels by. For example, 1 unit reduces by 3mmol/L means that 1 unit of your mealtime insulin reduced your blood glucose level by 3mmol/L.

Example

If your blood glucose level is 7mmol/L before a meal no correction would be needed and you would just give the units of mealtime insulin for the carbs.

If your blood glucose level was 10mmol/L pre-meal you would need to add an extra 1 unit of your mealtime insulin to that for your carbs to bring your blood glucose down by another 3mmol/L.

If your blood glucose level was 13mmol/L pre-meal you would need to add an extra 2 units of your mealtime insulin to that for your carbs to bring your blood glucose down by another 6mmol/L, and so on.

As people are more sensitive to insulin in the evening and at night, it is advised you give only half the correction at this time. For example, if you use 1 unit mealtime insulin reduces your blood glucose by 2mmol/L during the day, use 1 unit reduces by 4mmol/L at night and correct to only 8mmol/L at bed. Alternatively, work out how much correction dose you would give during the day and halve that dose.

Recipes

For recipes, use the methods described above to find the amount of carbs in each ingredient that needs to be “counted”. Add these values for each ingredient up to get the total amount of carbohydrate in the whole recipe.

Work out how many portions your recipe makes and divide the total carbohydrates by this number. This will give you the amount of carbohydrate in each portion.

An example is shown below for apple pie.

Ingredients containing carbs	**Weight (g)**	**Carbs per 100g**	**Total carbs. in ingredient, using formula**	**Calculations, using formula**
Apples	1000g (1kg)	12g	120g	12÷100 = 0.12 0.12 x 1000 = **120g**
Caster sugar	130g + 50g	100g	180g	100÷100 = 1 1 x 180 = **180g**
Sultanas	40g	70g	28g	70÷100 = 0.7 0.7 x 40 = **28g**
Flour	300g	76g	228g	76÷100 = 0.76 0.76 x 300 = **228g**
Total carbs. in recipe (makes 8 portions)	**556g**			
Carbs. per portion 1/8	**69.5g**			

Physical activity

Physical activity, which includes anything from the gym to mowing the lawn, reduces your blood glucose levels during and for up to 12 hours after the activity, increasing your risk of low blood glucose levels. It is very important to test your blood glucose levels as each individual has a different response to exercise.

For planned activity, it is possible to reduce your mealtime insulin at the meal before if the activity is planned to take place in the next two hours. You may start by reducing your mealtime insulin by 50% if doing planned exercise in the next two hours and then monitor the response, changing this to more or less if needed.

If the activity is unplanned, you may need an extra carb snack before. You should aim to have a blood glucose level of around 7-8mmol/l immediately before and ideally during exercise. If your blood glucose is below this then a snack will be required. If your blood glucose is already 7-8mmol/l then a snack may not be needed but this depends on the intensity and duration of the exercise.

Pre-exercise or during exercise snacks of 15g carbs include:

- Medium banana
- Four glucose tablets or five dextrose tablets
- 200ml smooth orange juice

- 4 jelly babies
- 150ml of cola
- 230ml Lucozade sport (approximately half a 500ml bottle)

In general, you will need 15g of quick acting carbohydrate for every 45 minutes of strenuous activity. If you are doing more than 45 minutes of strenuous exercise you may need to have more carbohydrate during the exercise session. You may also need a carbohydrate snack before bed.

You should never exercise if your blood glucose level is above 13.9mmol/L and you have blood ketones.

Snacks

If you are on an insulin pump, you need to bolus for every snack containing carbs. However, if on injections, it is best to avoid snacks with more than 10g. This is because any carbohydrate taken without rapid-acting insulin will cause your glucose levels to rise. If you do have a snack containing more than 10g carbs, it is necessary that you take an extra injection of bolus/mealtime insulin, however only bolus for the carbs and do not give a correction dose, unless you have blood ketones.

Examples of snacks of less than 10g carbs include:

- 30g cheese and 7 cherry tomatoes
- Hardboiled egg
- 1 tablespoon hummus and carrots, cucumber, celery, peppers
- 80g berries
- 30g plain nuts
- One wholegrain cracker with meat/cheese/low-sugar peanut butter
- 150ml of milk
- Small bar of dark chocolate
- Homemade Ice lollies made with diet drinks
- Sugar-free jelly

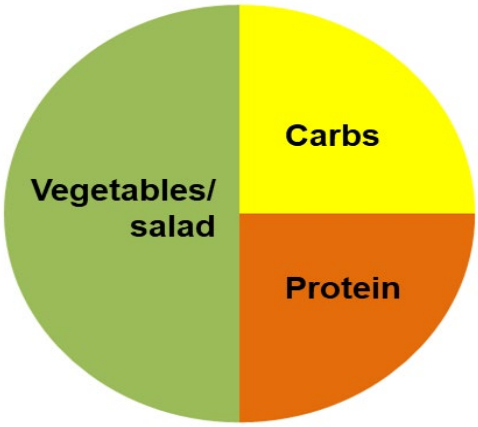
Pre-bed snack

It is advised pre-bed to aim for a blood glucose level of 7-8mmol/L, therefore if blood glucose is below this you may want to have a 15g carbohydrate snack.

Healthy portion plate

¼ plate Carbs portion of high-(GI) starchy

- Two
- Four
- Four
- One
- Half of a
- Two slices of boiled yam.



(yellow) or a fist-sized fibre low glycaemic index carbohydrates e.g.

medium slices of seeded/wholegrain bread.

tablespoons of cooked rice/pasta/couscous.

egg-sized new potatoes.

medium wrap/chapatti/pitta.

fist-sized portion of fufu/plantain.

¼ plate protein (roughly a palm size), e.g.:

- 120g raw or 85g cooked beef mince, pork or roast chicken
- 2 eggs
- 100g cooked chickpeas
- 100g cooked lentils
- 100g cooked mackerel or salmon or sardines in tomato sauce
- 140g or 4 tablespoons cooked prawns
- 30g cheese (matchbox size)

½ plate filled with a variety of different coloured vegetables and salad items. Some people find filling half their plate with vegetables or salad items first helps to ensure the rest of their plate is portioned correctly.

Alcohol

Alcohol recommendations for people with type 1 diabetes are the same as for the rest of the population, i.e., a maximum of 14 units per week for men and women.

It is recommended to have two alcohol free days per week. A pint of 4% ale, lager, stout or normal strength beer contains two units, a 250ml large glass of red or white wine is three units and a 25ml shot of brandy, rum, vodka, gin or whisky is one unit.

As a general rule, do not count the carbs in alcohol as alcohol may initially raise blood glucose, but overall reduces blood glucose level for a prolonged period after. For this reason, you may also need less mealtime insulin the next day at breakfast if

you have had large amounts of alcohol night the before as alcohol can continue to lower blood glucose as alcohol is digested.

You are at more risk of hypos if out dancing and drinking alcohol due to the combination of activity and alcohol. Therefore, you may want to use a sugary mixer in this case to avoid hypoglycaemia.

Follow the below advice:

- Never drink alcohol on an empty stomach.
- Have a meal with starchy carbohydrate with or before drinking.
- Have a starchy bedtime snack if you have been drinking during the evening , for example, toast or a bowl of cereal
- Have hypo treatment by your bed at night
- Carry identification and hypo supplies with you when you go out
- Make sure your friends know that you have got diabetes. **A hypo can be mistaken as drunken behaviour, which can be extremely dangerous if left untreated.**

You may notice from experience that when you do not count the carbs in alcohol your blood glycose levels are higher afterwards and do not ever come down into a low level. In this case, if you are having the alcohol with a meal, you could consider adding half the carbs in the alcoholic drink to your mealtime carb total.

If you have any questions, or if there is anything you do not understand about this leaflet, please contact:

Department details here

Russells Hall Hospital switchboard number: 01384 456111

This leaflet can be downloaded or printed from:

http://dudleygroup.nhs.uk/services-and-wards/

If you have any feedback on this patient information leaflet, please email dgft.patient.information@nhs.net

This leaflet can be made available in large print, audio version and in other languages, please call 0800 073 0510.

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Originator: Hannah Mconie. Date originated: September 2022. Review date: June 2025. Version:1. DGH ref.: DGH/PIL/02176