Manchester University
NHS Foundation Trust

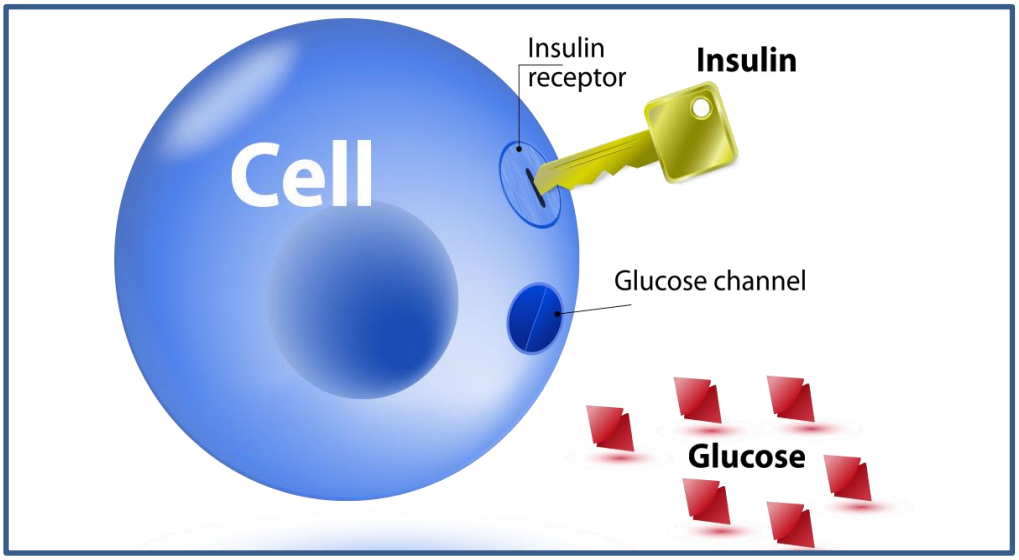
Carbohydrate Counting Guide

For Schools

What is Type 1 diabetes?

Type 1 diabetes is an auto immune condition where antibodies attack the beta cells in the pancreas to prevent them from making insulin.

Insulin acts as a **'key'** which allows glucose to enter the body's cells from the blood where it can be used for growth and energy. Without insulin blood glucose can become high and this can cause tiredness, thirst, irritability and increase the risk of picking up infections and diabetic ketoacidosis.



Is there a Special Diet for children with Type 1 diabetes?

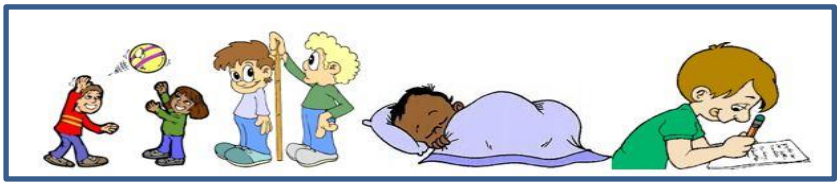
No!

A child with diabetes should be encouraged to follow a healthy balanced diet, the same a child without diabetes. A healthy balanced diet and lifestyle and maintaining a healthy BMI will help reduce risks of future complications.

For a child to manage their blood sugars appropriately – carbohydrates need to be accounted for and given the right amount of insulin depending on the amount of carbohydrate.

Why are carbohydrates important?

- Fuel for your brain, muscles, heart and nerves.
- Energy for playing and being active.
- They are packed full of B Vitamins which help with energy.
- Good source of fibre to help regular bowel movement.



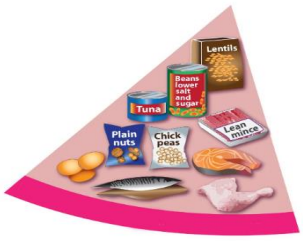
Where can carbohydrates be found?

All starchy foods contain carbohydrates which get broken down into blood glucose. Starchy carbohydrates should be part of all meals.
All need to be counted when carbohydrate counting.

Examples:
Potatoes, Rice, Pasta, Bread, Breakfast cereals, Oats, Flour products, Pizza, Pastry.

Fruit and vegetables are a good source of vitamins and minerals which are important for gut health and overall health.

All fruits and some vegetables contain fructose which gets broken down into blood glucose. The vegetables that we need to count for when carbohydrate counting are: **Sweetcorn, Peas and Carrots.**

	Protein helps with growth and repair within the body. Some proteins also contain some carbohydrates which we need to count for, these are**: Lentils, Pulses, and Beans**. Meats and fish coated breadcrumbs and batter need to be counted.
	Small amounts of fat in the diet are essential for aiding absorption of the fat-soluble vitamins. These however do not contain carbohydrates and should not be counted when carbohydrate counting.
	These foods should be eaten less often in children with or without diabetes. **They contain carbohydrates which need to be counted.** When eaten, we encourage them to be eaten with meals so insulin can be given to cover their carbohydrate contents.
	Milk, yoghurt, and cheese all contain calcium which is important for bone health along with vitamin D. These foods contain lactose which is broken down into glucose. In addition, some yoghurts may have added sugars. When carbohydrate counting, we count yoghurts and milks but not cheese due to its minimal lactose contents.
	Fluids are important for hydration. All sugary drinks should be avoided. Water and sugar free drinks should be encouraged. Concentrated juices should be limited to 1 small glass daily and drank with a meal and counted for. Milk can be given at meals and counted for when carbohydrate counting.

Summary of what carbohydrates needs to be counted

Starchy	Natural Sugars	Added Sugars
Bread Pasta Rice Potatoes Noodles Breakfast Cereals Pulse Vegetables – chickpeas, Dahl, baked beans.	All fruits Fruit juice Fruit smoothies Dried fruit Milk Yoghurt Drinking yoghurt Milkshake	Biscuits Cakes Muffins Cookies Brownies Doughnuts Sweets Chocolate Chocolate biscuits Ice cream Mousse Trifle Cheesecake

Summary of foods not to count

Protein foods	Fats	Others
Unprocessed meat and poultry Unprocessed fish Eggs Cheese	Butter Spreading fats Oils	Fresh tomatoes Lettuce Cucumber Broccoli Cauliflower

Carbohydrate counting

Tools to help with carbohydrate counting:

- **School menu's**
- **Labels**
- **Carbs&Cals book/app**

Unfortunately, **we may not be able to carbohydrate count all the menus of all the schools we cover** and so we rely on parents / guardians and schools working together. We also run training events for school staff to learn more about diabetes management which covers carbohydrate counting.

Key points:

- Portion sizes are not defined for children and young people with Type 1 Diabetes and they can eat **the same as any other child.**
- Insulin doses are affected by the amount of carbohydrates contained in the food. The portion size dictates the amount of carbohydrates in the food.
- The portion size needs to be accurate to +/- 10% to ensure accurate carb counting and therefore correct insulin delivery.
- A discussion should be had between parent / guardian, the school and catering teams as to the most practical, safe and effective method for ensuring accurate portion sizes are plated up, carbs calculated, and insulin delivered.
- School are required to make reasonable adjustments to ensure that young people can have school meals as their peers do.

School Menus

We endeavour to carb count school meals when they are provided. If there is a change in menu or catering provider, please contact the diabetes team so we can review this.

Example of council school menu carbohydrate counted by Dietitians

Greyed out foods contain no carbs. gC= grams of carbohydrates
If a child wants more e.g. 2 slices of garlic bread instead of 1 slice, do not forget to double the carbs OR weigh and use 'Carb&Cals'.

Week 1	Monday 'Planet Earth Day'	Tuesday 'Street Food Day'	Wednesday 'Traditional Day'	Thursday 'World Food Day'	Friday 'Favourites'
Main	Macaroni Cheese 90g=17gC 160g=32gC 210=38gC	Beef & Black bean Stir Fry Noodles 200g=28gC	Lamb Yorkshire Pudding 1=5gC , Gravy (2 ladles) = 5gC	Fajita Chicken Brown Rice 1 Tbsp/30g=10gC OR 3tbsp/90g=30gC	Sticky BBQ Chicken (8gC each)
Vegetarian	Veg Meatballs=1gC each Pitta Small 35g = 19gC Large 70g = 40gC	Falafel Burger x1 (57g) = 14gC Mango Chutney 1tbsp(20g) =12gC Potatoes 85g = 13gC	Cheese, Tomato, Red Onion Tart If tin cut into 24pieces=12gC each	3 Bean (5gC) Mexican Chilli Wrap ½ wrap=17gC 1 wrap=35gC	Fish Bites (4GC EACH) Jacket potato ** See Below
Sides/Veg	Sweetcorn 1tbsp/40g =6gC Peas 1 tbsp/40g= 4gC	Broccoli and Carrots	Roast Potatoes 85g = 15gC OR 10gC per egg sized potato	Tortilla Chips 5 (16g) =10gC Roasted Vegetables Sweetcorn 1tbsp/40g=6gC	Potato Crispers (7-8) 55g=19gC Baked Beans 1tbsp/ 40g=5gC Peas 1tbsp/40g=4g C
Salads	Seasonal Salads	Salads & Crudités Carrot/Cucumber/Celery	Cabbage / Cauliflower / Salad	Salads & Tomato Salsa	Salads & Coleslaw
Dessert	fresh seasonal fruit 35g=7gC OR 70g = 15gC OR 90g = 9gC	Homemade Fruit and Oat Flapjack Primary 1 x 30th (60g) = 28gC	Rice Pudding and Peaches 190g=28gC	Frozen Mango Yogurt=10gC	Beetroot & Choc Brownie 40th (37g) = 16gC
Daily Options	Bread 20gC/Slice Baguette = 10gC/Fruit platter 10g /80g yoghurt 10gC/cheese and crackers x 3 = 14gC **Jacket potato (ideally weight & use Carbs&cals app), Small (150g) = 32gC/medium (200g) = 42gC				

How to carbohydrate count using food labels and packaging

All packaged foods have a nutritional label for the main nutrients, including Energy (kcal/KJ), Protein, Carbohydrate and Fat.

For carbohydrate counting it is important that we use "carbohydrates" not "of which sugars"

	Nutrition Information	
Average Values	**Per 100g**	**Per cake**
Energy	1603 kJ 380 kcal	196 kJ 46 kcal
Protein	4.9g	0.6g
Carbohydrate (of which Sugars)	**70.8g** 52.5g	**8.6g** 6.4g
Fat (of which Saturates)	8.0g 4.1g	1.0g 0.5g
Fibre	2.2g	0.3g
Sodium* *equivalent as salt	0.1g 0.3g	Trace < 0.1g

- This is always given per 100g, in this example 70.8g.
- Sometimes per portion, in this example **per cake (8.6g)**.
- The portion figure works well for foods like biscuits, bars, yogurts, and ready meals where you tend to eat the suggested portion size.

However, if you eat a different amount you will need to calculate the amount of carbohydrate in your individual portion.

$$\frac{\text{Carbohydrate per 100g}}{100} \times \text{Weight of portion you are going to eat} = \text{Carbohydrate in your portion}$$

A full list of carbohydrate values per 100g and per portions is available from diabetes UK.

Example of carbohydrate counting using food labels and packaging

	Per 100g of cornflakes	***Per portion (30g) of cornflakes***
Energy	381 kcal	***114 kcal***
Fat Of which saturates	0.9g 0.2g	***<1g*** ***<1g***
Carbohydrate Of which sugars	***84g*** 8g	***25.2g*** ***2.4g***
Protein	7g	***2.1***
Salt	1.13g	***0.3***

Packaged foods like breakfast cereals often have a food label as above. This label tells us:

- In 30g of cornflakes there are 25g of carbohydrates.
- In 100g of cornflakes there are 84g of carbohydrates.

If a different sized portion is eaten then do the following equation:

1. Find out how much carbohydrate is in 1g of cornflakes by dividing the carbs per 100g by 100 e.g. Cornflakes as above ***84 ÷ 100 = 0.84g of carbs in 1g of cornflakes.***

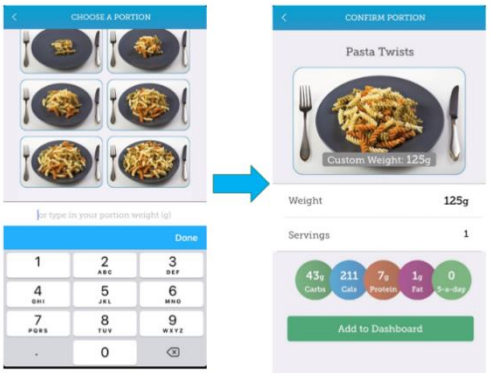
2. Multiply the amount of carbohydrates in 1g of cornflakes by the weighed portion size e.g. 42g. ***0.84 x 42g = 35.2g of carbs in 42g of cornflakes*** .

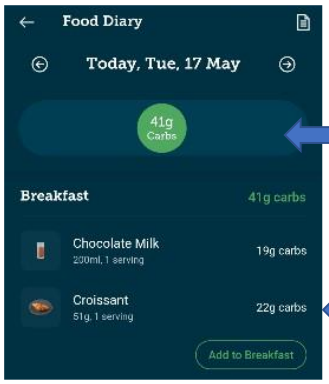
Using Carbs&Cals book as a Good visual aid

Note this is the weight of the cooked pasta.
Always use cooked weights.

The amount of carbohydrates in 145g of Cooked pasta.

Carbohydrate counting using the Carbs & Cals ® App

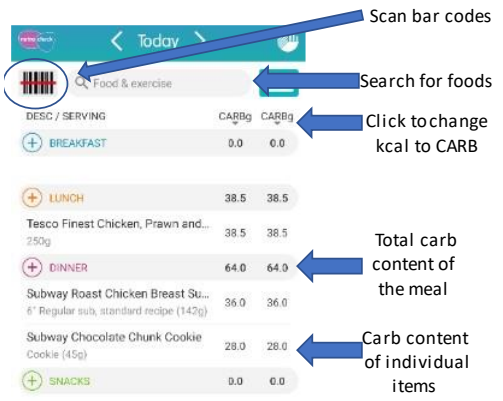




Total carb content of the meal

Carb content of individual items

Carbohydrate counting using the Nutracheck App



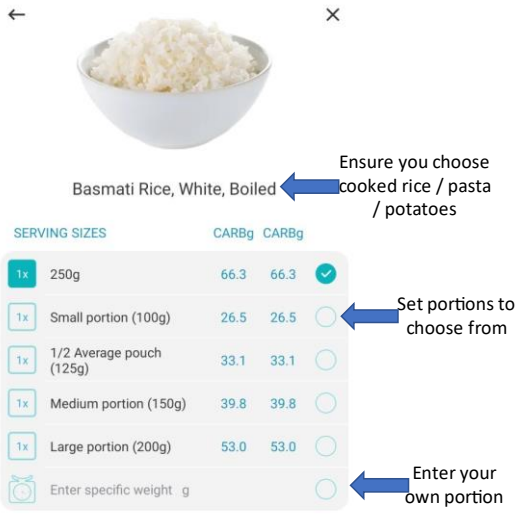
Scan bar codes

Search for foods

Click to change kcal to CARB

Total carb content of the meal

Carb content of individual items



Ensure you choose cooked rice / pasta / potatoes

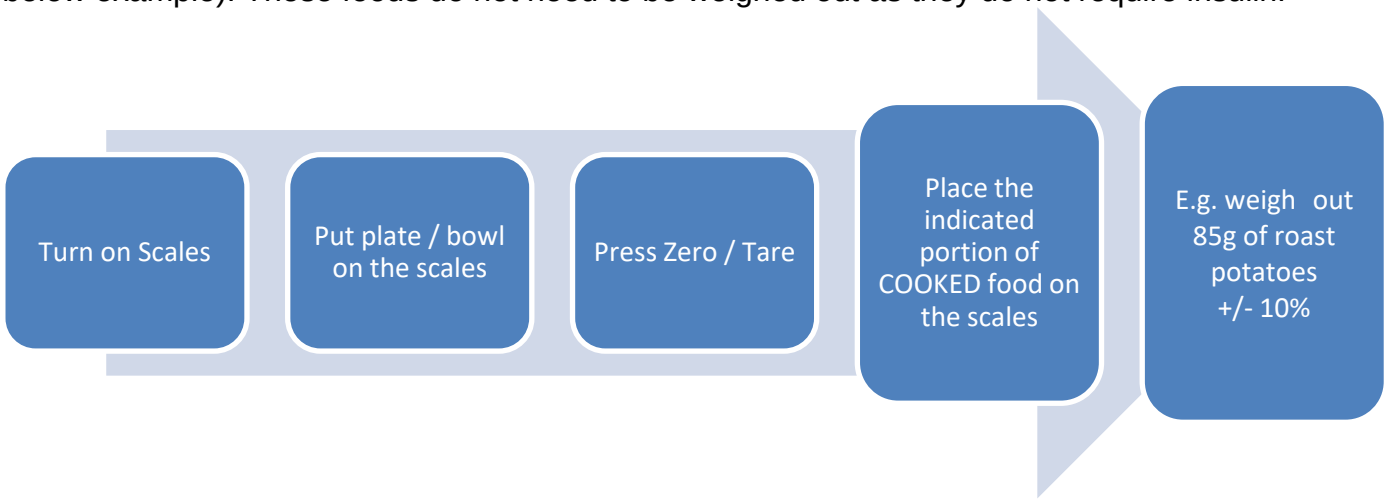
Set portions to choose from

Enter your own portion

Daily weighed portions

1. Parents / guardians choose with the child which meal they want each day or in advance
2. The portions and carb content are worked out by parents / dietitians **OR using the 'Carbs&Cals' app/book.**
3. The indicated portion is weighed out +/-10% each day for the child by the kitchen, TA or support staff.
4. Insulin should be given 15 minutes prior to lunch in the knowledge that the correct portion +/-10% has been plated up for the young person.

Below is an example of a child's choice for the day. The portion column shows how much food should be weighed out. The carb content of each portion will be entered into the insulin pump or blood glucose meter. Please note some foods are carbohydrate free e.g. Roast Turkey (in the below example). These foods do not need to be weighed out as they do not require insulin.



Food	Portion	Carbs
Roast Turkey	-	-
Roast potatoes	85g	15g
Yorkshire pudding	X 1	5g
Sage and onion stuffing	20g	14g
Fruit Salad	70g	15g
Total		**49g**

Handy measures

Cup measures are a standard measure. They are useful as they are consistent sizes in comparison to traditional serving spoons used in catering.

Below is a cup measure guide. The parent / guardian / school will go through the menu with the child and identify which foods they are going to choose and identify the appropriate measure for each food which contains carbs e.g. ½ cup rice or 1 cup pasta or 1/3 cup peas

* if using tablespoon(15ml) measures- ensure this is a standard measure*

These options may be useful for older children in secondary school / day out / after school and breakfast clubs.

Pro's	**Con's**
Portion is consistent	School to buy standard cup measures
The food does not need to be weighed daily	The portion may not be the same as other children receive / may not be age appropriate
	This method is not appropriate for all foods e.g. pie / lasagne / deserts which will still need to be weighed out

Food	**Handy measure (e.g. 1 cup)**	**Portion weight**	**Carbohydrate Content of portion**
Cows Milk	1 cup	250ml	**12**
	½ cup	125ml	**6**
	¼ cup	65ml	**3**
Grapes	1 cup	160g	**24**
	½ cup	80g	**12**
	¼ cup	40g	**6**
Cooked Pasta	1 Cup	150g	**50**
	½ cup	75g	**25**
Cooked Rice	1 cup	140g	**47**
	½ cup	70g	**23**
Mashed potato	1 cup	250g	**36**
	½ cup	125g	**18**
Cooked couscous	1 cup	230g	**61**
	½ cup	115g	**30**

Food	Portion size	Carbs(g)/ Portion
Starchy carbohydrates		
Thick chips / Skinny chips	5x thick chips / 5 x skinny chips	10g/5g carbs
Mash potato	1 ice cream scoop	10g carbs
Roast / boiled potato	1 egg sized potato	10g carbs
Jacket potato with skin / flesh only	1 small (150g)	32g/30g carbs
Jacket potato with skin / flesh only	1 medium (200g)	42g/40g carbs
Jacket potato with skin / flesh only	1 large (250g)	52g/50g carbs
Rice (boiled)	1 tablespoon(15ml)	10g carbs
Pasta (boiled)	1 tablespoon (15g)	7g carbs
Couscous(boiled)	1 tablespoon	10g carbs
Quinoa (boiled)	1 tablespoon	5g carbs
Wrap	1 average	30g carbs
Slice of bread	1 slice Medium / thick	15g/20g carbs
Pitta bread	1 small / 1 large	30g/55g carbs
Slice baguette /French stick / garlic bread	1” (inch)	10g carbs
Burger bap	small	25g carbs
Cracker (Jacobs)	1	5g carbs
Popadom	Small / large (standard)	4g/7g carbs
Taco shell	1 medium	10g carbs
Yorkshire pudding	Small / large	5g/10g carbs
Dairy		
Natural yoghurt	125g pot	10g carbs
Milk	100ml	5g carbs
Ice cream	1 scoop	10g carbs
Vegetables/Pulses		
Peas	1 tablespoons / 40g	4g carbs

Food	Portion size	Carbs(g)/ Portion
Vegetables/Pulses		
Sweetcorn	1 tablespoons / 40g	6g carbs
Chickpeas	1 tablespoon	6g carbs
Dahl (thick) / boiled red lentils	1 tablespoon	7g carbs
Pakora	1 average size	5g carbs
Baked beans	1 tablespoon	5g carbs
Meat / fish		
Fish finger	1	4g carbs
Sausage	1	5g carbs
Chicken Nugget	1	3g carbs
Fruit		
Grapes / cherry	1 medium size	1g carbs
Satsuma	Small/large	5g/10g carbs
Apple	Fun size	8g carbs
Raisins	1 match box size	10g carbs
Banana	Small/medium/large	13g/17g/26g carbs
Dried Apricots / dates / kiwi	1	5g carbs

Breakfast Club handy Measures

If the young person attends breakfast club, below are useful handy measures. Please note that many breakfast items are refined carbohydrates that we recommend are eaten in moderation. We have identified which foods would be preferred for general health as well as blood glucose management.

	Food	Handy measure (e.g. 1 cup)	Portion size in grams (weight)	Carbohydrate Content of portion
Recommended	Milk	1 cup	100ml 1 cup / 250ml	5g carbs 12g carbs
	Weetabix	X 1 X 2		14g carbs 28g Carbs
	Shredded Wheat biscuits	X1 X2		18g Carbs 36g Carbs
	Shredded wheat bite size	1/2cup 1 cup	28g 58g	24g Carbs 49g Carbs
	No added sugar Muesli	1/2 cup 1 cup	52g 104g	33g Carbs 66g Carbs
	Wholemeal bread	X 1 slice		14g carbs (or check packet)
	Small apple	Fun size		8g carbs
	Grapes	½ Cup Each grape	80g	12g carbs 1g carb each
	Natural yoghurt	1 small pot	125g	10g carbs
	Satsuma	Small / large		5g /10 g carbs
More likely to cause spikes in blood glucose levels	Rice Crispies		30g	26g carbs
	Cornflakes	1 cup	30g	25g carbs
	Scotch pancake	X1		14g carbs
	Croissant	X1		18g carbs
	50:50 Bread / white bread	X1 Slice		17g carbs
	Jam/ Honey	1 tablespoon	18g/ 20g	14g carbs
	Chocolate hazelnut Spread	1 tablespoon	17g	10g carbs

School Trips

Parents / guardians should be advised on the catering arrangements when children attend school trips **in advance**. If a packed lunch is required, parents / guardians should advise school on the carb content of each lunch item. If outside catering is to be used; the carb counting of the meals should be done by parents / guardians prior to the trip.

Fussy / un-eaten meals

A child with diabetes should have the **same requirement to finish their meal as any other child**. If a small amount of the meal is left, monitor the child for the following 90 minutes to ensure that if the child has a hypo (<4mmol) it can be treated effectively. You may gently encourage the child to finish their meal, however, we do not advocate force feeding.
If fussy eating or food refusal is common, speak with parents / guardians contact diabetes team to discuss further individualised advice.

Paediatric Diabetes Team

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