Gwent Schools Meals
Catering Information Pack on
Carbohydrate Counting and
Dose Adjustment of Insulin for
Children with Type 1 Diabetes
Introduction to Carbohydrate Counting

Carbohydrate counting can be a useful tool to help children manage their blood glucose levels.

All carbohydrates (starches and sugars) are digested to glucose which is released into the blood stream causing a rise in your blood glucose level. By counting the amount of carbohydrate in food, you can learn to predict the rise in your blood glucose level after eating different types and amounts of carbohydrate. This can be used to calculate the amount of insulin you need to give.

The aim of carbohydrate counting is to allow the children to choose the type and amount of carbohydrate they wish to eat and be able to match it with the appropriate amount of insulin. It is still important to have a healthy balanced diet.

Insulin adjustment

In order to use this system, the children need to be on a “Multiple Daily Injection” (MDI) regimen. This involves giving rapid acting insulin with meals and a longer acting, slow release background insulin once or twice daily.

The dose of rapid acting insulin given will depend on their pre-meal blood glucose level and the amount of carbohydrate eaten at their lunch time meal. The dose of your background slow release insulin will not change as frequently as it is not directly linked to your carbohydrate intake.

This approach requires a lot of commitment and time from all the school staff as you all will need to learn about the amount of carbohydrate in different foods.
What can you eat?

The foods suitable for people with diabetes are ordinary ones that can be bought in the supermarket.

You may be advised to change the way you cook some foods or alter the ingredients used in recipes but the basic foods themselves will mostly be those you have always eaten. Enjoy eating a variety of foods.

**Food for a healthy life**

You need sufficient calories, protein, vitamins and minerals for daily living and for normal growth in children and young people.

The plate model shows the different proportions of food groups to aim for in your daily diet.

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Learning more about carbohydrates
Which foods contain carbohydrate?

Carbohydrate is found in the following foods:

### Starchy carbohydrate

- Cereal Starch
  - Grains e.g. wheat, barley, rye, rice and oats
  - Bread and flour products e.g. biscuits, cakes, pastries
  - Breakfast cereals
  - Pasta
  - Noodles
  - Couscous

- Vegetable starch
  - Potatoes and potato products, sweet potato, yam
  - Sweetcorn
  - Legumes and pulses e.g. baked beans, red kidney beans, peas and lentils

**Cereal and vegetable starches are digested to glucose**

### Sugary carbohydrate

These include both natural sugars found in food and sugars added to food.

**Natural sugars found in food:**

- Fruit and fruit juices
  - The sugars found in fruit are fructose and sucrose

- Milk and milk products e.g. yoghurt, mousse, custard and ice cream
  - The sugar found in milk is lactose

**Sugar added to food:**

- Sucrose is the sugar added to many foods to make them sweet e.g. sweets, chocolates, biscuits, cakes, desserts, jams, marmalade and sugary drinks

**Sucrose and lactose are digested to glucose**
### Quick guide to identifying carbohydrate in your diet

<table>
<thead>
<tr>
<th>Foods Containing Carbohydrate</th>
<th>Foods Containing Minimal Carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>These foods contain significant amounts of carbohydrate and <strong>need to</strong> be counted in your diet</td>
<td>These foods contain minimal amounts of carbohydrate and do <strong>not need to be</strong> counted in your diet</td>
</tr>
</tbody>
</table>

#### Cereal Starch
- Breakfast cereals
- Bread and flour products
- Rice and grains e.g. couscous
- Pasta
- Noodles

#### Protein
- Meat
- Fish
- Eggs
- Cheese
- Nuts
- Soya

#### Vegetable Starch
- Potatoes and potato products
- Beans and pulses
- Sweet potato
- Yam

#### Fat
- Butter
- Margarine
- Cream
- Oils

#### Sugary Carbohydrates
- Fruit and fruit juices
- Milk and milk products
- Foods containing added sugar e.g. cakes, sweets and chocolates

#### Most vegetables
- Salad
Calculating Carbohydrate

Carbohydrate can be identified and counted in food using:

- Food labels
- Carbohydrate Ready reckoner
- Internet sites and manufacturers’ information
- Books and leaflets
- Food weighing scales
Food labels are very useful for determining the amount of carbohydrate in foods:

- When you know your portion size e.g. 25g packet of crisps or
- When you do not know the portion size using the carbohydrate value per 100grams of food

**If you know the portion size of the food:**

A food label always lists nutrients per 100g of the food, but also often lists them per portion. The example below shows the food label from a packet of crisps

<table>
<thead>
<tr>
<th></th>
<th>Per 25g Pack</th>
<th>Per 100g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>548Kj</td>
<td>2190 KJ</td>
</tr>
<tr>
<td></td>
<td>131 kcal</td>
<td>525 kcal</td>
</tr>
<tr>
<td>Protein</td>
<td>1.8g</td>
<td></td>
</tr>
<tr>
<td>Carbohydrate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of which sugars</td>
<td>12.5g</td>
<td>50.0g</td>
</tr>
<tr>
<td>of which</td>
<td>0.6g</td>
<td>2.5 g</td>
</tr>
<tr>
<td>Fat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of which</td>
<td>8.3g</td>
<td>33.0g</td>
</tr>
<tr>
<td>saturates</td>
<td>0.7g</td>
<td>2.6 g</td>
</tr>
<tr>
<td>of which</td>
<td>6.5g</td>
<td>25.9g</td>
</tr>
<tr>
<td>mono-unsaturates</td>
<td>0.7g</td>
<td>2.8g</td>
</tr>
<tr>
<td>of which</td>
<td>1.0g</td>
<td>0.50g</td>
</tr>
<tr>
<td>poly-unsaturates</td>
<td>0.13g</td>
<td>1.27g</td>
</tr>
</tbody>
</table>

**This packet of crisps contains 12.5g of carbohydrate per 25g packet**

When calculating the carbohydrate content of a food, it is important you use the TOTAL carbohydrate value and not the “of which sugars” value.
Using the information on the food label

The food label can also be used to determine how much carbohydrate is in 100g of a food. This can then be used to calculate the amount of carbohydrate in your food portion (see below)

How to work out the amount of carbohydrate in a portion
You will need a calculator, digital weighing scales and the food label.

**Step 1**
Using a food label, find out the amount of carbohydrate in 100g

<table>
<thead>
<tr>
<th>Cooked Pasta nutritional information</th>
<th>Per 100g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td></td>
</tr>
<tr>
<td><strong>Carbohydrate</strong></td>
<td>22g</td>
</tr>
<tr>
<td>of which sugars</td>
<td></td>
</tr>
<tr>
<td>Fat</td>
<td></td>
</tr>
<tr>
<td>Fibre</td>
<td></td>
</tr>
</tbody>
</table>

For example:

**Step 2**
Weigh your portion in grams using digital scales.

For example:

200g

**Step 3**
Divide the amount of carbohydrate per 100g (step 1) by 100.
For example:

22g ÷ 100 = 0.22

**Step 4**
Then multiply that answer by the portion size (step 2).
For example: 0.22 X 200g = 44 g

So there is 44 g of carbohydrate in a 200g portion of pasta.
Using the information of the food label when you do not know your portion size

The food label can also be used to determine how much carbohydrate is in 100g of a food. This can then be used to calculate the amount of carbohydrate in your food portion (see below)

How to work out the amount of carbohydrate in a portion

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Step 1
Using a food label, find out the amount of carbohydrate in 100g

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<tr>
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<td></td>
</tr>
<tr>
<td>of which sugars</td>
<td></td>
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<tr>
<td>Fat</td>
<td></td>
</tr>
<tr>
<td>Fibre</td>
<td></td>
</tr>
</tbody>
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Step 2
Weigh your portion in grams using digital scales.

Step 3
Divide the amount of carbohydrate per 100g (step 1) by 100.

Step 4
Then multiply that answer by the portion size (step 2).

So there is …..g of carbohydrate in a ……g portion of pasta.
Manufacturer’s information websites

Many food manufacturers provide information on the carbohydrate content of their foods. A selection can be found at the websites below:

**Burger King**
http://www.burgerking.co.uk/

**Domino’s pizza**
http://www.dominos.uk.com

**Harvester**
http://www.harvester.co.uk

**KFC**
http://www.kfc.co.uk/nutrition

**McDonalds**
http://www.mcdonalds.co.uk

**Pizza Hut**
http://www.pizzahut.co.uk

**Starbucks**
http://www.starbucks.co.uk

**Subway sandwiches**
http://www.subway.com

**Wetherspoons**
http://www.jdwetherspoon.co.uk
There are a number of different books available which list the carbohydrate content of different foods. Some list the carbohydrate values per portion and others per 100g of food.

**Some examples include:**

Collins Gem Fat and Calorie Counter. Collin Gem Published 2006

Collins Gem Carb Counter ISBN 0-00-717601-5


Nutrition scales can be used to calculate the amount of carbohydrate in meals and snacks.

They can be particularly useful in the following situations:

- When trying to work out the amount of carbohydrate in a food that does not have a fixed portion size such as pasta or rice.

- When working out the amount of carbohydrate in foods that vary considerably in their size such as baked potatoes or bananas.

- When plating up a meal that contains more than one type of carbohydrate-containing food such as Jacket potato and beans or roast potatoes and Yorkshire puddings.

- When working out the amount of carbohydrate in a home-made recipe such as a cake containing flour and sugar.
How do they work?

Typically a codebook comes with the scales. The food is placed on the scales and the corresponding code for that food is inputted into the scales. The scales will then calculate the amount of carbohydrate in the portion.

Where can I get nutrition scales from?

Your Dietitian may be able to help you find a set of scales. There are also a number of stores online that stock nutrition scales.

**Salter** sells a few different types of nutrition scales ranging from around £40 - £60.
Products shown are the Salter Nutri-Weigh Slim Scale 1406 and the Salter 1440 Nutri-Weigh & Go Dietary Computer Scale.

Available at:
- [www.salterhousewares.com/salter_uk](http://www.salterhousewares.com/salter_uk)
- [www.e-scales.co.uk](http://www.e-scales.co.uk)
- [www.rapidscales.com](http://www.rapidscales.com)
- [www.amazon.co.uk](http://www.amazon.co.uk)

**Rosemary Conley** sells a set called *EnerGi Nutri-Scales* for around £40.
Available at:
- [www.rosemaryconley.com/shop](http://www.rosemaryconley.com/shop)
- [www.amazon.co.uk](http://www.amazon.co.uk)

Lloyd’s Pharmacy Nutritional Scale. Cost approx. £10
[www.lloydsparmacy.com](http://www.lloydsparmacy.com)

My Weigh Nutriscale Dietary Scale. Cost approx £20
Available at:
[www.e-scales.co.uk](http://www.e-scales.co.uk)
Sample meals containing carbohydrate

Below are some examples of different types of meals illustrating the amount of carbohydrate found in different types of foods

### Breakfast

<table>
<thead>
<tr>
<th>Food</th>
<th>Portion Size</th>
<th>Carbohydrate per portion (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Juice</td>
<td>1 glass / 200ml</td>
<td>10</td>
</tr>
<tr>
<td>Weetabix</td>
<td>2 biscuits</td>
<td>30</td>
</tr>
<tr>
<td>Semi Skimmed Milk</td>
<td>1 glass / 200ml</td>
<td>10</td>
</tr>
<tr>
<td>Boiled Egg</td>
<td>1 egg</td>
<td>Negligible</td>
</tr>
<tr>
<td>Wholemeal Bread</td>
<td>2 medium slices</td>
<td>30</td>
</tr>
<tr>
<td>Margarine</td>
<td>30g</td>
<td>Negligible</td>
</tr>
<tr>
<td><strong>Total Carbohydrate</strong></td>
<td></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>

### Packed Lunch

<table>
<thead>
<tr>
<th>Food</th>
<th>Portion Size</th>
<th>Carbohydrate per portion (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitta bread</td>
<td>2 medium Pitta</td>
<td>60</td>
</tr>
<tr>
<td>Chicken salad filling</td>
<td>60-90g</td>
<td>Negligible</td>
</tr>
<tr>
<td>Cherry tomato</td>
<td>1 medium</td>
<td>Negligible</td>
</tr>
<tr>
<td>Fromage Frais</td>
<td>1 small pot/60g</td>
<td>10</td>
</tr>
<tr>
<td>Banana</td>
<td>1 medium /100g</td>
<td>25</td>
</tr>
<tr>
<td>Cereal Bar</td>
<td>1 bar/25g</td>
<td>20</td>
</tr>
<tr>
<td>Apple</td>
<td>1 medium /150g</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total Carbohydrate</strong></td>
<td></td>
<td><strong>130</strong></td>
</tr>
</tbody>
</table>

### Evening Meal

<table>
<thead>
<tr>
<th>Food</th>
<th>Portion Size</th>
<th>Carbohydrate per portion (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolognaisme Sauce</td>
<td>90g</td>
<td>Negligible</td>
</tr>
<tr>
<td>Cooked Spaghetti</td>
<td>5 tablespoons /220g</td>
<td>50</td>
</tr>
<tr>
<td>Grated Cheese</td>
<td>30g</td>
<td>Negligible</td>
</tr>
<tr>
<td>Green Salad</td>
<td>30g</td>
<td>Negligible</td>
</tr>
<tr>
<td>Garlic Bread</td>
<td>¼ baguette</td>
<td>20</td>
</tr>
<tr>
<td>Fruit Yoghurt</td>
<td>1 pot / 125g</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total Carbohydrate</strong></td>
<td></td>
<td><strong>90</strong></td>
</tr>
</tbody>
</table>
Calculating your Insulin Dose

In order to adjust your rapid acting insulin it is necessary to learn how to:

- Identify and calculate the amount of carbohydrate in your meals and snacks
- Calculate the amount of rapid acting insulin required to match the quantity of carbohydrate in the food you are going to eat.
- Calculate the correction dose of insulin you require depending on your pre-meal blood glucose level

### Insulin: Carbohydrate Ratio

Once you have learned how to count the amount of carbohydrate in your meals, you can calculate the amount of insulin needed. Everyone has a different insulin requirement.

e.g. 1 unit of rapid acting insulin is required for every 10 grams of carbohydrate

**This is known as the insulin to carbohydrate ratio.**

Your Diabetes team will work this out with you.

### Insulin Correction Dose

If your blood glucose level is too high before a meal, you will need to give additional insulin to bring it down to within the normal range (4-7mmol).

e.g. 1 unit of rapid acting insulin is needed to lower the blood glucose by 3 mmol/l

**This is known as your insulin correction ratio.**

Your Diabetes team will work this out with you.

### Hypos

It is important that you do not correct a high blood glucose level if you have had a hypo within the last ….. hours.

**If your blood glucose level is below 4mmol/l, you must treat the hypo before you have your meal. You may consider giving less insulin.**
Gill Regan
Claire Baker
Hannah Fisher
Paediatric Dietitians

Department of Nutrition and Dietetics
Royal Gwent Hospital, Newport, NP20 2UB

Telephone 01633 234288
Treatment of Hypoglycaemia

Hypoglycaemia is when your blood glucose level is less than 4.0mmol/l. If possible, please check your blood glucose level prior to treatment of hypoglycaemia.
Once blood glucose level is above 4.0 mmol/l, give an extra carbohydrate snack e.g. a piece fruit, a sandwich, 2 digestive biscuits, oat based cereal bar or meal if appropriate

**What is Hypoglycaemia?**
Hypoglycaemia means low blood glucose. It is often called a “hypo” and is defined as a blood glucose level below 4.0 mmol/l. Some people don’t feel the symptoms of a hypo at this level but it is important to treat any levels below 4 mmol/l.

**Possible causes of hypoglycaemia:**
- Too much insulin
- Too little food (e.g. missed or delayed meal or snack)
- Physical activity
- Getting very hot or cold
- Drinking alcohol

**Signs and symptoms of hypoglycaemia:**
There are many different signs and symptoms of hypoglycaemia and not everyone will experience them all. Below are some of the signs and symptoms that you may experience:
- Weakness
- Hunger
- Pale face
- Sweating
- Shaking
- Dizziness
- Large pupils/glazed expression
- Tingling around the mouth
- Mood changes e.g. irritability
- Crying inappropriately
- Visual disturbance
- Feeling sick
- Headache

Remember, if you experience any of the above signs and symptoms:
- Check your blood glucose level.
- Treat your symptoms of Hypoglycaemia immediately.