

Understanding carbohydrate counting: A young person's perspective



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The period following a diagnosis of type 1 diabetes can be a difficult and unsettling time for a young person and their family. In this short perspective piece, the author draws on his experiences to provide a practical approach for other young people trying to learn how to count carbohydrates. Healthcare professionals may wish to draw upon this resource in their work with children and young people with diabetes.

For a young person with type 1 diabetes, being able to accurately calculate the amount of carbohydrate in something you are going to eat (a process known as “carb” counting) is essential for the effective management of your blood glucose levels. If you are on multiple daily injections of insulin or an insulin pump, you need to be able to work out the correct dose to give yourself, in order to maintain a healthy blood glucose level. The wrong amount of insulin can result in either high or low blood glucose, which can have dangerous short- and long-term consequences if untreated. Not only does a normal level reduce health risks, it also simplifies the general management of diabetes. By reducing the number of hypo- and hyperglycaemic episodes you have, it becomes easier to get on with other things.

Once you can confidently calculate carbohydrates, you have much more freedom to eat what you want and when you want, further reducing the restrictions that having diabetes can place on you. For example, eating out at restaurants can be daunting, but, owing to the experience I have of carb counting at home, I feel confident enough to estimate the dose of insulin I need to take and, for the majority of the time, I am accurate enough to remain within my target blood glucose range.

Calculating the carbohydrate in foods and then translating that information into an insulin dose is a difficult process that can be further complicated by an individual's need to account for different insulin-to-carbohydrate ratios at different times of the day. However, it can be made easier by breaking it up into steps that you can follow each

time, and consistent use of this technique should boost your confidence when deciding what dose of insulin is needed.

- 1 Split up what you are going to eat into its components. For example, a cheese sandwich can be split into the bread, cheese and margarine.
- 2 Decide which of these components you need to calculate the carbohydrate content for; vegetables, protein and fat-based foods, such as cheese, have negligible carbohydrates so can be ignored. In the sandwich example, the cheese has no carbohydrates and there is such a small amount of margarine that it can be ignored. Only the carbohydrate in the bread needs to be calculated.
- 3 Find out how much carbohydrate is in 100 g of each component. There are many books and online resources, such as Diabetes UK's *Carbohydrate Reference List* (<http://bit.ly/1PKFFWw>), that list many common foods and the amount of carbohydrate in them. If the food is bought, it is likely to have a label on the packaging indicating how much carbohydrate there is in 100 g.
- 4 Use this to calculate the carbohydrate contained in 1 g of the food simply by dividing the carbohydrate per 100 g by 100. For example, if there are 42 g of carbohydrate in 100 g of sliced bread, then 1 g contains $42 \div 100 = 0.42$ g of carbohydrate.
- 5 Weigh each food component, investing in suitable electronic scales to make the process easier. Multiply the weight of the component in grammes by the carbohydrate contained in 1 g of the food, in order to find the weight of carbohydrate in the portion you are going to eat.

In the example, 2 slices of bread weigh 80 g and contain $80 \times 0.42 = 34$ g of carbohydrate.

- 6 You need to know the insulin ratios you are on for specific times of the day (i.e. the number of grammes of carbohydrate “covered” by each unit of insulin) so you can use that to calculate the insulin dose you need for the food. For example, if your ratio is 1:10, this represents 1 unit of insulin per 10 g of carbohydrate. Divide the weight of carbohydrate by your personal ratio. In the cheese sandwich example, therefore, the dose of insulin you need for 34 g of carbohydrate is $34 \div 10 = 3.4$ units. Depending on whether you are on a pump or the type of insulin pen you use, you may be able to give half units. However, it is always better to round down the insulin dose to avoid a “hypo” (when blood glucose drops too low). Eating the cheese sandwich would, therefore, require 3 units of insulin.

This process is not practical when eating out and needs to be adapted. The place serving the food will often have carb values for the foods they serve, so the first thing you should do is ask whoever is serving you if they are available. If they aren't, then the *Carbs & Cals* book and app (www.carbsandcals.com) are great tools for visually estimating how much carbohydrate is in the meal. *Carbs & Cals* has pictures of different portion sizes along with nutritional information, including the amount of carbohydrate in the portions.

If you live with your parents, the chances are they make most of your meals. If they learn to carb count as well, they will be able to work out the insulin needed to cover a meal as they prepare it. This is simple enough when using a resource with carbohydrate values for different foods: simply weigh each of the ingredients in the meal; calculate the carbs in each, writing down the values if you need to; add all the carbs up to reach the total for the meal; and then use your insulin ratio to calculate the insulin dose. Using a calculator for even the simple sums can make things a lot easier and seem like less of a hassle. Learning to carb count is especially important for parents and careers of younger children with diabetes who are likely to struggle with the sums. Parents can then teach their child to carb count over time as their maths skills develop.

People learn things in different ways, but getting hands-on experience and using this step-by-

step process regularly to count the carbs in your meals should allow you to get used to and grow comfortable with knowing what doses of insulin you need and help you control your blood glucose levels in a much safer, more organised manner.

I believe that carb counting is the most important skill that a person with type 1 diabetes should learn after being diagnosed. However, that can be hard to do, especially when it is taught soon after diagnosis; the chances are that the individual will be exhausted and will struggle to learn anything, especially if they have difficulties with numeracy. I think, therefore, that the dietitian or other healthcare professional responsible for teaching this technique should assess the skill level of the individual and be able to pass on their own knowledge in a suitable way. The ability to work out correct insulin doses is critical in the management of a young person's diabetes and control of their blood glucose levels.

Unfortunately, understanding and controlling your blood glucose levels goes beyond just carb counting. One of the key things you have to be aware of is that both during and after exercise the glucose level in your blood will be affected. Carrying out any kind of prolonged exercise can carry with it the risk of a hypo. To avoid this, it is advisable to eat something, such as some small sweets, before exercise to raise your glucose levels. Importantly, make sure you have something with you to treat any hypo that might occur during or after the activity.

Another serious time is during illness, when your blood glucose levels can be affected in many ways and it will often be more difficult to keep them normal. When you are ill, you should monitor your blood more regularly than usual and be aware that you may need to adjust your insulin doses in order to counter any irregularities. This could involve giving a correction dose of insulin if you have particularly high glucose levels, or adjusting your ratios at certain times of the day.

The biggest factor in the ability to control your blood glucose is confidence. If you are confident about how you do certain things and how these will affect your glucose levels, you are more able to effectively predict and then react to any changes. Regularly monitoring your blood glucose level enables you to learn, over time, how it changes due to different factors. Everyone is different and learning how your own blood glucose levels will change is key to gaining the confidence you need. ■

Box 1. Key points for healthcare professionals.

- Many people lack maths skills. Make sure you have a good idea of how able a person is before starting to teach them “carb” counting.
- Have resources to give to newly diagnosed children and young people and their carers to help them with their learning to carb count.
- Try to get people to calculate the carbohydrate in their meals during their hospital stay as practice.

Box 2. Key points for families.

- Practice makes perfect.
- Everyone is different. Learn how your own glucose levels are affected by different foods and activities.
- Monitor your glucose levels regularly.
- Keep a record of the carb values of foods that you eat regularly.
- Look for patterns within your glucose readings to see if you need to adjust insulin ratios at certain times of the day.