Dietary considerations in type 1 diabetes

Carbohydrate counting in primary care

- The primary dietary focus for people living with type 1 diabetes is adjustment of rapid-acting insulin doses to match carbohydrate intake.
- Carbohydrate counting allows the individual freedom to eat what they want, when they want, while helping optimise glycaemic control (see *Box 1*).
- Offer referral to a diabetes specialist dietitian or to structured education courses, such as DAFNE or BERTIE. Signpost to web-based resources such as www.bertieonline.org.uk.
- Healthy eating advice should also be offered, taking into account the person's nutritional needs, cultural preferences and beliefs. The Mediterranean diet is one option, although there are many other healthy, traditional dietary patterns based on nutrient-dense, unprocessed foods.
- Teach what a carbohydrate is and that carbohydrates are digested into glucose. Discuss the sources of sugar/glucose in everyday foods and drinks (see *Further reading* overleaf).
- All carbohydrates raise blood glucose levels. Explain the importance of knowing the total carbohydrate amount in a portion (i.e. the sum of all starch + any sugar in that portion).
- The rate of carbohydrate digestion and degree of post-prandial blood glucose change is affected by the glycaemic index (GI) and glycaemic load (GL) of the carbohydrate, along with other macronutrients, such as fat or protein, that the carbohydrate is consumed with.

Box 1. Carbohydrate-counting tools

- **Carbs & Cals** produce books and a smartphone app: www.carbsandcals.com
- When using food labels, look on the **back** of pre-packaged food and drinks for the **total carbohydrate** in grams (g) per 100 g of food or per portion. The "of which sugars" value is only a component of the total carbohydrate.
- **Explore food** website, for home-cooked recipe analysis: https://explorefood.foodafactoflife.org.uk
- Restaurant nutrition information web pages.
- Kitchen weighing scales, a resource giving carbohydrate amount per 100 g of food and a calculator.
- Nutritional weighing scales

Amount of carbohydrate (CHO) in a known weight of food =

$$\frac{\text{CHO per 100 g of food}}{100} \times \text{weight of food eaten (g)}$$

Insulin:carbohydrate ratios

- The insulin-to-carbohydrate ratio is the number of grams of carbohydrate covered by each unit of rapid-acting insulin. It varies with time of day, is individual to each person and is refined through trial and error.
- Formulae are based on total daily insulin dose (TDD).
- TDD is the sum of all basal and bolus insulin units given over a 24-hour period. Ideally, the mean TDD calculated over 3 consecutive days is used.
- Individual TDD varies depending on body composition, activity levels and level of insulin resistance.
- Formulae (such as the "500 rule") can help ratio estimation. Divide 500 by TDD to find a ratio for 1 unit of insulin:*x* g carbohydrate.
- If the 500 rule doesn't appear to provide sufficient insulin for carbohydrate, try recalculating the ratio using 400 as the numerator.
- For women, insulin:carbohydrate ratios may need to be adjusted monthly to cope with premenstrual hormonal changes, which temporarily increase insulin resistance. As a pregnancy progresses, insulin resistance steadily increases.

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Author
Rose Butler, Diabetes Specialist Dietitian, Luton & Dunstable University Hospital.

Supporting adults with type 1 diabetes to lose weight

- 60% of adults with type 1 diabetes in the UK are overweight or obese.
- The anabolic effects of insulin are greater when delivered exogenously. Weight loss requires a calorie deficit, which is challenging alongside managing glycaemia with insulin.
- Hypoglycaemia treatment is a major limiting factor that prevents weight loss. Treating a single hypoglycaemic episode (with 15–20 g glucose + a small starchy snack) can add around 200 calories to the day's intake.
- Are insulin doses that are too high causing hypoglycaemia? Is the individual afraid of having a hypoglycaemic episode? Are they snacking to prevent one? Ensure that insulin doses are optimised.
- Physical activity is an important component of weight management. A major barrier to participation is fear of exercise-induced hypoglycaemia. Adjustments can be made to insulin doses before and after exercise (see *Box 2* for sources of advice).
- Hyperglycaemia can cause hunger that results in eating more than is needed. However, as some calories will be lost via glycosuria or some mass is lost via body fat catabolism, an increase in weight may not be experienced. (Other factors to consider are shown in *Box 3*.)
- Once insulin doses are optimised and glycaemic targets are achieved, if an individual is not losing weight or is gaining weight, question if they are eating more than they need.

"The primary dietary focus for people living with type 1 diabetes is adjustment of rapid-acting insulin doses to match carbohydrate intake."

Box 2. Exercise and type 1 diabetes websites

- **Diabetes UK**: Sports nutrition and type 1 diabetes: https://bit.ly/2s1qIQO
- **EXTOD** (Exercise for Type 1 Diabetes): Advice for people with type 1 diabetes to undertake safe and effective exercise: www.extod.org
- **ExCarbs** (Sansum Diabetes Research Institute): Help with planning insulin and carbohydrate requirements for exercise: https://excarbs.sansum.org
- **runsweet.com**: Managing diabetes with different sports and exercises: www.runsweet.com

Box 3. Other factors influencing weight management

- Excessive portion and crockery sizes
- Unnecessary snacking adds calories
- Lack of sleep or stress often promotes hunger
- Thirsty rather than hungry? Have a sugar-free drink
- Alcohol contains calories, increases appetite and can cause a hypoglycaemic episode that requires treatment with additional calories in the form of glucose

Further reading, guidelines and resources

- Davidson PC, Hebblewhite HR, Steed RD, Bode BW (2008) Analysis of guidelines for basal–bolus insulin dosing: basal insulin, correction factor, and carbohydrate-to-insulin ratio. *Endocr Pract* **14**: 1095–101
- Diabetes UK (2018) *Evidence-based nutrition guidelines for the prevention and management of diabetes*. DUK, London. Available at: https://bit.ly/2xR60mp
- Diabetes UK (2019) *Food labels made easy*. DUK, London. Available at: https://bit.ly/2N6274y
- Diggle J (2019) How to improve carbohydrate awareness. *Diabetes & Primary Care* **21**: 85–6; http://bit.ly/2ztc4Ce
- NICE (2017) *Type 1 diabetes in adults: diagnosis and management* (NG17). NICE, London. Available at: https://www.nice.org.uk/guidance/NG17
- TREND-UK (2018) *Diabetes: why do I sometimes feel shaky, dizzy and sweaty? Hypoglycaemia explained*. Available at: https://bit.ly/2QSZKTY
- Yates T (2019) How to recommend physical activity to people with diabetes safely. *Diabetes & Primary Care* **21**: 113–14; http://bit.ly/2lUwgJG