

## **Lower Carb Dietary option, Doctor/Nurse protocol Norwood Avenue GP Surgery: T2D, prediabetes. Updated 2026**

**General point:** Remember not all low carb diets are necessarily good, for example a diet coke and pepperoni sausage diet is low carb, but not well formulated. A well formulated low carb diet will be full of fibre and essential nutrients(1) - see the Norwood diet sheet. In general, we are trying to avoid the high blood glucose levels that lead to poor health. The new continuous glucose monitoring concept of 'time in range'(2) can demonstrate this helpfully. The key idea is to help people understand which foods increase their blood glucose and encourage them consider other nutrient-dense foods instead. It often helps to view people and their high blood sugars as an interesting puzzle rather than a problem; one to be worked out with the patient. This enables a collaborative approach

### **At the first appointment:**

Explore potential benefits/ risks of a low carb approach to T2D (eg medications risk of hypo) and make a start on motivation. The idea of diabetes remission or stopping medication can be very motivating for many people. A particular opportunity is presented by someone who has just had their first HbA1c > 48mmol/mol. T2D is only diagnosed and coded on a second raised result so it is possible to 'head off' the diagnosis by improving blood sugar levels before that second test. 36 of our patients have avoided being coded and added to the Norwood diabetes register in this way.

An example of the type of question you can ask.

'You have a range of different possible futures with respect to your diabetes, which will you choose?'  
'Average weight loss on low carb is 9Kg, is this of interest to you?' etc.,

Check are the patients interested in the low carb approach

Explain the basic physiology of sugar starting with the fact that 'your HbA1c shows how 'sugary' your diet has been in the last few months', and explaining sugar can be thought of as a metabolic poison to someone with T2D.

Ask: 'Where do you think the sugar has come from in your diet?'

### **Explain dietary sources of glucose with sugar equivalence infographics(3)**

Give the Norwood standard diet sheet describing a low carb approach.

Establish baseline data; Weight, waist circumference, height, bloods; HbA1c, renal, fasting lipids, FBC. This is important otherwise so they can see progress at their next review.

\*Feedback is key to behaviour change\*

Enter EMIS computer code 'low carbohydrate diet'.

### **Medications**

Three risks to be aware of (4):

1. **Risk of hypoglycaemia** (Insulin, gliclazide) reduce dose/stop but monitor
2. **Risk of DKA** particularly with SGL2Inhibitors (5) in which case the DKA may be euglycaemic (normal blood glucose). Stop these before starting the diet, monitor blood glucose and

weight carefully. SGLT2 inhibitor drugs; combined with a low carbohydrate diet, have the potential to lead to diabetic ketoacidosis that may be masked by relative normoglycaemia. This class of drugs probably ought to be avoided in this context or at least the dosage reduced. For some patients with comorbidities such as chronic kidney disease, some experienced practitioners / nephrologists acknowledge the effectiveness of SGLT2s and opt to using both SGLT2 and a low carb diet, BUT this is undertaken with close monitoring and proper attention to the 'sick day rules' for these drugs.

3. **Risk of hypotension**, explain that with weight loss, BP may well improve and medications for this may be reduced or cut back. Postural hypotension could be an issue. (6)

**Salt:** Insulin has sodium-retaining properties (6) so for those with T2D going low carb lower insulin causes significant loss of sodium and consequently a diuresis. Patients may well need to increase their salt intake – particularly in the first few weeks of the diet. Those on diuretics may be able to stop them

Suggest a review date - often 2 or 4 weeks depending on assessed risks and patient preference, perhaps longer for pre-diabetes

### **On review**

Weigh, measure waist and BP. Review medications – do any need to be changed/reduced? See above

How is it going? Problems/suggestions

Ask about hunger and appetite. Hungry people are unlikely to stick to a diet. Many people who drop the carbs also drop their insulin sufficiently to allow them to use their own fat as a source fuel (7) - so they become 'fat burners' who are far less hungry. Do they need to drop their carbs a little more? Another possibility to help with hunger is to increase the dietary protein.

Think about the possibility of 'food addiction' for those who are struggling with cravings or experiencing weight gain. If moderation is impossible, rather like someone with an alcohol problem, abstinence from 'trigger foods' may be the answer. Possibly suggest a book; 'Fork in the Road' is available on Amazon

Three worrying patterns with respect to HbA1c and weight

1. **If both weight and HbA1c are climbing** the most common reason is 'carb creep' **NOT** failure of the diet. Check for this by reviewing dietary intakes. Over time the diets of many patients can drift. It's helpful to see this as a learning opportunity. We all learn from our mistakes!
2. **Weight loss alongside a climbing HbA1c** is worrying – ask a doctor about this. Is this actually T1D or pancreatic malignancy?
3. **HbA1c 'too good'** eg. 28mmol/mol could the patient be anaemic?

**Constipation:** Magnesium supplements can help a lot with this and can improve insulin sensitivity (8). Magnesium citrate is a good start.

More fluids.

More nuts and green veg.

Produce EMIS computer graphs of Weight, HbA1c etc. as feedback to maintain motivation.

Do they wish to continue?

Are they happy to share their anonymised data?

If so, enter EMIS GP computer code 'obtaining consent'

Would they like to attend our early evening group sessions? Explain how to find out when the next one is.

## Next steps

Review date and agree next blood test (HbA1c etc.) - usually at 2 months from the start, but this depends on your risk analysis and patient preference.

**Lipid profiles: Don't just look at the total cholesterol.** Information from full fasting lipid profiles are preferable, they contain so much more relevant information to help you build a better picture of individual risk. It's interesting to note that in our paper with Prof Roy Taylor our audit recorded significant improvement in all our measures of cardiovascular risk in a group who chose a low carbohydrate approach to improve their T2 diabetes. A raised fasting triglyceride can be an important marker of poor metabolic health(9) it is often neglected despite being linked to all-cause mortality. Triglyceride/HDL ratios may be an even better predictor and usually (but not always) improve significantly on low carb (10, 11). So, when assessing cholesterol levels to build a risk profile, rather than the total cholesterol don't forget to look at LDL cholesterol, triglyceride and cholesterol/HDL cholesterol ratio.

## Continuous glucose monitoring (CGM)

Increasingly, people with T2D are monitoring blood glucose with these devices. It is probable that metrics other than HbA1c such as time in range are important in terms of outcomes (12, 13). An important study (14) looked at CGM use in T2D and found it was associated with a significant reduction in hospitalisations. The place for these devices in routine care of patients with T2D not using insulin is unclear, but many people are buying them and seem to be learning a lot. It is likely their use as a powerful educational tool will eventually appear in guidelines. Some of our patients are supplying estimated HbA1c results generated by their CGMs. The question arises; how accurate are they? Also, how should we handle this data? A recent study suggests the CGM-generated estimate of HbA1c is a fair one (15) but for people claiming particularly good HbA1c results it is a good idea to look at both the daily graphs and the 'time in range' which should be 100%. A recent development is that time in range can now be coded on the EMIS system. Some patients report their CGM sensors fall off - consider recommending CGM 'covers' or patches available on Amazon

NICE UK T2D guidelines 1.3.6: Individualise recommendations for carbohydrate and alcohol intake, and meal patterns. **Reducing the risk of hypoglycaemia should be a particular aim for a person using insulin or an insulin secretagogue. [2009]**

Often this is achieved by increasing dietary carbs at the expense of weight gain. **An alternative** is to reduce carbs and the drugs involved. This has the advantage of weight loss and improvements in BP.

More recent evidence emphasises **the importance of weight loss** in improving blood sugar(16). 'A 2025 systematic review and meta-regression of randomized controlled trials found that for every 1% decrease in bodyweight, the probability of achieving complete diabetes remission increased by approximately 2 percentage points, and partial remission by about 3 percentage points. This relationship was independent of age, sex, race, diabetes duration, baseline BMI, HbA1c, insulin use, or the type of weight loss intervention. Notably, partial remission was observed in 48% of individuals with 10–19% weight loss, and complete remission in nearly 80% of those with ≥30% weight loss at one year, underscoring a strong dose–response effect

This update of the NICE guidelines is relevant to our low carb work

## Overweight and obesity management

NICE guideline [NG246] Published: 14 January 2025

**NICE** National Institute for Health and Care Excellence

The first recommendation in the dietary approaches section (1.16.1) emphasises "a flexible and individualised approach"

Recommendation 1.16.3 explicitly states that an energy deficit can be achieved by lowering specific macronutrient content "for example, low-fat or **low-carbohydrate diets**" (emphasis is, obviously, mine).

### References

1. Zinn C, Rush A, Johnson R. Assessing the nutrient intake of a low-carbohydrate, high-fat (LCHF) diet: a hypothetical case study design. *BMJ Open*. 2018;8(2):e018846.
2. Battelino T, Danne T, Bergenstal RM, Amiel SA, Beck R, Biester T, et al. Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations From the International Consensus on Time in Range. *Diabetes Care*. 2019;42(8):1593-603.
3. David Unwin DH, Geoffrey Livesey,. It is the glycaemic response to, not the carbohydrate content of food that matters in diabetes and obesity: The glycaemic index revisited. *Journal of Insulin Resistance*. 2016;2016;1(1), a8. (<https://insulinresistance.org/index.php/jir/article/view/8/11>).
4. Murdoch C, Unwin D, Cavan D, Cucuzzella M, Patel M. Adapting diabetes medication for low carbohydrate management of type 2 diabetes: a practical guide. *Br J Gen Pract*. 2019;69(684):360-1.
5. Murray SW, McKelvey S, Heseltine TD, Henderson G, Singh J, Unwin D, et al. The "discordant doppelganger dilemma": SGLT2i mimics therapeutic carbohydrate restriction - food choice first over pharma? *Journal of Human Hypertension*. 2021.
6. Unwin DJ, Tobin SD, Murray SW, Delon C, Brady AJ. Substantial and Sustained Improvements in Blood Pressure, Weight and Lipid Profiles from a Carbohydrate Restricted Diet: An Observational Study of Insulin Resistant Patients in Primary Care. *International Journal of Environmental Research and Public Health*. 2019;16(15):2680.
7. Dimitriadis G, Mitrou P, Lambadiari V, Maratou E, Raptis SA. Insulin effects in muscle and adipose tissue. *Diabetes Res Clin Pract*. 2011;93 Suppl 1:S52-9.
8. Morais JBS, Severo JS, de Alencar GRR, de Oliveira ARS, Cruz KJC, Marreiro DDN, et al. Effect of magnesium supplementation on insulin resistance in humans: A systematic review. *Nutrition*. 2017;38:54-60.
9. Liu J, Zeng FF, Liu ZM, Zhang CX, Ling WH, Chen YM. Effects of blood triglycerides on cardiovascular and all-cause mortality: a systematic review and meta-analysis of 61 prospective studies. *Lipids Health Dis*. 2013;12:159.
10. Gjuladin-Hellon T, Davies IG, Penson P, Amiri Baghbadorani R. Effects of carbohydrate-restricted diets on low-density lipoprotein cholesterol levels in overweight and obese adults: a systematic review and meta-analysis. *Nutr Rev*. 2018.
11. Hu T, Mills KT, Yao L, Demanelis K, Eloustaz M, Yancy WS, Jr., et al. Effects of low-carbohydrate diets versus low-fat diets on metabolic risk factors: a meta-analysis of randomized controlled clinical trials. *Am J Epidemiol*. 2012;176 Suppl 7(Suppl 7):S44-54.
12. Wright LA, Hirsch IB. Metrics Beyond Hemoglobin A1C in Diabetes Management: Time in Range, Hypoglycemia, and Other Parameters. *Diabetes Technol Ther*. 2017;19(S2):S16-S26.
13. Wilmot EG, Lumb A, Hammond P, Murphy HR, Scott E, Gibb FW, et al. Time in range: A best practice guide for UK diabetes healthcare professionals in the context of the COVID-19 global pandemic. *Diabetic Medicine*. 2021;38(1):e14433.

14. Reaven PD, Newell M, Rivas S, Zhou X, Norman GJ, Zhou JJ. Initiation of Continuous Glucose Monitoring Is Linked to Improved Glycemic Control and Fewer Clinical Events in Type 1 and Type 2 Diabetes in the Veterans Health Administration. *Diabetes Care*. 2023.
15. Lazar S, Potre O, Ionita I, Reurean-Pintilei D-V, Timar R, Herascu A, et al. The Usefulness of the Glucose Management Indicator in Evaluating the Quality of Glycemic Control in Patients with Type 1 Diabetes Using Continuous Glucose Monitoring Sensors: A Cross-Sectional, Multicenter Study. *Biosensors*. 2025;15(3):190.
16. Kanbour S, Ageeb RA, Malik RA, Abu-Raddad LJ. Impact of bodyweight loss on type 2 diabetes remission: a systematic review and meta-regression analysis of randomised controlled trials. *Lancet Diabetes Endocrinol*. 2025;13(4):294-306.