

Value of carbohydrate counting

Kathaleen Briggs Early 

Recently, Bawazeer *et al* reported on their study evaluating carbohydrate counting (CC) knowledge among adults with type 1 diabetes in Saudi Arabia (SA).¹ Anyone working with persons who have diabetes and use CC, and especially readers of BMJ Prevention, Nutrition and Health (BMJ NPH) will appreciate this study, as it highlights the value of this important tool for diabetes self-management education and support (DSMES), while also emphasising the need to understand the type 1 diabetes epidemic SA and many other countries are currently facing. Those of us who work in the field of diabetes—whether it be research or patient care—have long recognised the global type 2 diabetes epidemic, but less attention has been devoted to the explosion in type 1 diagnoses.

The International Diabetes Federation's Diabetes (IDF) Atlas Reports 2022 recently published the 10 countries with the highest prevalence of type 1 diabetes for all ages: the USA (highest), India, Brazil, China, Germany, the UK, Russia, Canada, SA and Spain.² Not only do we as a global nutrition and prevention community have a huge burden to mitigate, but we need more effective tools to help people living everyday with diabetes self-manage this chronic condition better. Since the Diabetes Control and Complications Trial,³ we have known CC is beneficial, particularly for those with type 1 diabetes,⁴ and it is the currently recommended nutrition approach alongside continuous blood glucose monitoring or self-monitoring of blood glucose via finger stick, as it has the biggest effect on postprandial glucose excursions.⁵ Evaluating the implementation and accuracy of CC in daily life among persons living with type 1 diabetes adds some important

information to this puzzle from a less-well studied area of our global community.

Bawazeer *et al*¹ used the previously validated⁶ and translated version⁷ of the AdultCarbQuiz to evaluate CC knowledge. Their study population was recruited from a diabetes centre in Riyadh and included 224 adult patients (mean age 28.2 years) who were able to read Arabic and had a diagnosis of type 1 diabetes for at least one year. Most participants were well educated, with over 60% reporting a graduate degree, single (68.8%) and female (59.4%). Nearly 90% of the participants were using multiple daily injections, but only 54% reported use of CC. Less than 12% reported using an insulin pump. Most had also had recent contact with a dietitian and almost one-third reported five or more dietitian visits in the past 2 years.

The AdultCarbQuiz includes 43 questions addressing ability to identify carbohydrates in foods; ability to count carbohydrate content in food portions; nutrition label reading; understanding glycaemic targets; prevention and treatment of hypoglycaemia using carbohydrate foods; and the ability to tally CC in meals.

Bawazeer *et al*¹ found that those participants who scored higher on the AdultCarbQuiz had better glycaemic control, which mirrors findings reported by others among both youth and adults with type 1 diabetes.^{4 8–10} In this rather highly educated SA population, about half of the participants used CC and had acceptable mean knowledge scores, but those who scored highest were taught CC five or more times, illustrating the importance of burying the outdated concept of 'one and done' when it comes to DSMES. However, this can be difficult even under the best healthcare systems.

Numerous barriers make routine DSMES, including accurate and everyday CC, challenging for the person living with diabetes. Barriers include but are

not limited to access to dietitians with real-world diabetes teaching experience, patient–provider communication, cultural comfort with the health care team, transportation to appointments, out-of-pocket costs for healthcare professional visits, access to healthy food options, ability to take time away from work and health-literacy and numeracy-literacy skills. Given the global audience of BMJ NPH, readers likely already recognise there is great variation across the globe concerning access to diabetes education and dietitians sufficiently trained in CC.^{11–13}

Portion size estimation is difficult, even for the experienced and well educated. As humans, we tend to underestimate portions sizes and carbohydrate amounts, especially as portions become larger.¹⁴ When foods are made into an entire meal, our ability to count those carbohydrates becomes even more limited, which aligns with the findings from Bawazeer *et al*¹ and others.^{14 15} Few participants were able to accurately count the carbohydrates in meals. Some have proposed embracing technology to help us get better at counting the carbohydrates, sometimes with limited success.^{16 17}

The use of the effective health literacy-based teaching style, 'teach-back', promoted by the American Heart Association, the American Diabetes Association, Association of Diabetes Care and Education Specialists, American Nurses Association and other health care professions,^{18–20} was not reported by Bawazeer *et al*¹. 'Teach-back' is frequently used by nurses, but less so by dietitians and the international use of 'teach-back' among dietitians is even less well studied.²⁰ A tool such as C-O-U-N-T C-A-R-B-S,²¹ developed for nurses and other non-dietitians, could be more widely adopted as a patient-centred, literacy-based approach to reinforcing CC concepts taught by dietitians.

While nutrition education is essential for DSMES, we are doing a disservice to our patients with diabetes if we do not also teach patients about comprehensive lifestyle behaviours including physical activity, sleep habits and stress management. Helping patients and healthcare professionals shift their thinking and

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reconsider these key lifestyle behaviours as important as medication and other medical interventions will be essential for successful population-based diabetes mitigation strategies. This exact principle was highlighted in a 2020 BMJ NPH article by Pot *et al* where they showed long-term (24-month postintervention) efficacy of a lifestyle medicine intervention resulting in improvements in clinical and quality of life outcomes.²² While this was studied in a type 2 diabetes population, not type 1, the lifestyle medicine principles incorporated into the Pot *et al*²² intervention are recommended for all persons with diabetes, regardless of type.^{5 19}

As Bawazeer *et al*¹ reported in this study among type 1 Saudi adults, dietitians and diabetes educators around the globe clearly have a primary role in the teaching of CC to patients with type 1 diabetes, but other members of the health care team are equally important to ensuring patient success implementing and accurately using CC in daily life. Only through effective collaboration among the health care team and patients, and routine reminders of CC concepts (ie, portion sizes) and other key lifestyle behaviours, will we be successful in mitigating the tidal wave of diabetes-related related premature mortality that IDF and others predict by 2040.^{2 23}

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