

# Dietary education for patients with type 2 diabetes: failure or success?

Chung-Mei Ouyang\*



## ABSTRACT

Type 2 diabetes is a significant public health concern. Food intake has been strongly linked with obesity and diabetes, not only related to the volume of food but also in terms of the composition and quality of diet. Improvement in the elevated blood sugar levels can be achieved through diet management; thus, the patients could be prevented from developing the diabetes complications. Health-care providers should encourage patients to understand the importance of diet which may help in diabetes management, appropriate self-care and better quality of life. However, making the changes to diet is difficult proposition for many people. Health-care providers trained to work with people who have diabetes on appropriate goal-setting around self-care behaviors to better enable them to accomplish the changes needed for better outcomes. Many factors are discussed for finding the best practice to deliver the dietary education for patients with type 2 diabetes.

## Introduction

The etiology of diabetes is complex and is associated with irreversible risk factors such as age, genetic, race and ethnicity and reversible factors such as diet, physical activity and smoking. Diabetes can be controlled through improvement in patient's knowledge, attitudes and practices. These factors are considered as an integral part of comprehensive diabetes care [1]. Unhealthy eating habits are one of the leading causes of diabetes. Failure to follow a strict diet plan and physical activities, along with prescribed medication are leading causes of complications among patients with type 2 diabetes [2]. Diabetic patients require reinforcement of diabetes education including dietary management through health-care providers to encourage them to understand the disease management better, for more appropriate self-care and better quality of life [3]. However, the comparative effectiveness of these approaches and the characteristics of patients who benefits from each approach are still unknown. Dietitians or other health-care providers seldom evaluate the effect of dietary education for patients with type 2 diabetes during their routine work. It is

important to examine the effectiveness of diabetes education from related factors and settings such as nutrition information and barriers.

## Contents in dietary education (knowledge)

Nutrition education is a critical component of diabetes self-management education [4], and improves glycemic control similar to many glucose-lowering medications [5]. Patients' food selection and dietary behaviors may be influenced by the strong knowledge about diabetic diet recommendations. Significant positive relationship was observed between knowledge regarding diabetic diet and the amount of the calorie needs [6]. Knowledge regarding diabetic diet is essential and is needed to achieve better dietary behaviors [6]. Dietitians advised that nutrition is very important in managing diabetes, not only type but also quantity of food which influences blood sugar. About the eating pattern or plan for a person with type 2 diabetes, the recommendation from the American Diabetes association states that there is not a "one-size-fits-all" eating pattern for individuals with diabetes [7]. Carbohydrate intake has a direct

Department of Dietetics, National Taiwan University Hospital Hsin-Chu Branch, Taiwan

\*Author for correspondence: maggieoy@gmail.com

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effect on postprandial glucose levels in people with diabetes and is the primary macronutrient of concern in glycemic management [8]. Despite the inconclusive results of the studies evaluating the effect of differing percentages of carbohydrates in people with diabetes, monitoring carbohydrate amounts is an effective strategy for improving postprandial glucose [7]. A randomized controlled study was designed to evaluate the role of two approaches to nutrition education as part of diabetes-self management education and support (DSME/S). It showed that in a pre-specified subgroup analysis of patents with the change in HbA1c from baseline improved in the carbohydrate counting (-0.86%,  $p=0.006$ ) and the modified plate method groups (-0.76%,  $p=0.01$ ) compared to controls after 6 months intervention. Both diabetes nutrition education methods improved glycemic control as part of DSME/S [9]. However, from the SHIELD study indicated that knowledge alone does not correlate with improved outcomes [10]. Some studies indicated that targeted interventions using a collaborative approach achieve better outcomes that are cost-effective and measurable in terms of behavioral change and improved glycemic control [11-13].

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**Educational skills for health-care providers**

Individualization of diabetes self-management education especially in nutrition therapy based on an individual's cultural preferences, health beliefs, psychosocial status, self-management skills, literacy, and numeracy skills is important to facilitating behavior change [14,15]. However, we are not sure if health-care providers have sufficient resources or skills to promote healthy eating for patients with diabetes. Lack of advanced knowledge of nutrition regarding diabetes diet and skill of communicating with diabetes patients such as psychological training were barriers for health-providers in an effective way of dietary education. Psychological skill training is also a fundamental skill to perform diabetes education. Dietitians, who are trained to deliver medical nutrition therapy, play an important role in diabetes counseling. However, given limited access to dietitians and possible higher program costs relative to other types of intervention delivery agent, nutrition education is sometimes provided by other types of delivery agents such as health care professionals, community health workers or other. A systematic review and meta-analysis study of nutrition

education for diabetes prevention found that dietitian-delivered interventions, compared with those delivered by other personnel, achieved greater weight reduction. No consistent trend was identified across different delivery channels (in-person vs. technology-delivered) [16].

However, it is not well understood how health-care providers (dietitians, non-dietitians or diabetes educators) translate diet guideline for their patients. Dietitians or diabetes educators need to provide individualized, patient-centered diabetes care plans including dietary education for better adherence because almost all diabetes care is performed by patients outside of a healthcare setting [17]. Patient-centered approaches to diabetes care that empower and equip patients to take responsibility for managing their diabetes are critical [18]. Individualizing nutrition education according to literacy and numeracy may be especially important because individuals with low health literacy and numeracy have difficulty understanding food labels and estimating portion sizes [19,20], as well as carbohydrate counting [9]. Educators need to learn how to translate nutrition and behavioral science into practical advice for themselves and their patients. Moreover, the diabetes educator training should include in-depth knowledge and skills in the biological and social sciences, communication, counseling and education to provide self-management education to diabetic patients.

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**Barriers to diabetes self-management**
**■ Patient barriers**

As recent review studies identified that there were many barriers to self-management of diabetes. The barriers for individuals included empowerment, literacy, motivation, problem-solving skills, depression, age, cognitive decline, other diseases, and others related to environment [21,22]. Family members also provide significant social support for self-care of diabetic patients [23], and lack of family support could be one of important barriers for patient self-care management. From the findings of a psychological intervention trial to nurses' experiences of participating, the patient barriers included lack of attendance at appointments, lack of willingness to commit to scheduled appointments and patients not prioritizing diabetes self-management [24]. Important barriers are represented by cultural and language differences of ethnic minorities. Therefore, it is

important for patients to conquer barriers, be truly empowered and take an active role in their daily diabetes self-management.

#### ■ Educators barriers

Skilled health-care providers or diabetes educators could be the crucial point in the effective dietary education. They and their patients address barriers such as physical, emotional, cognitive, and financial obstacles and develop coping strategies [25]. Besides the inadequate diabetes and nutrition professional training, the barriers of diabetes educators or health-care providers include how patients understanding the nutrition messages, when translating nutrition guidelines and what factors the educators deliver influence the uptake of the information by those with type 2 diabetes. A study about communicating diabetes best practice showed that nurses were concerned that they were over-stepping their professional role when using motivational interviewing (MI) skills or dealing with emotive consultations, as they were not qualified as psychologists. Some nurses felt that they were harassing patients to come to appointments and also needed to adjust their professional role to change their style of their consultations [24].

#### ■ Systemic barriers

People with diabetes who participated in several educational sessions of diabetes self-management training are more likely to receive care in accordance with recommended guidelines and to comply with diabetes-related prescription regimens, resulting in lower costs and utilization trends [25]. In many settings, there is a shortage of professional staff who are specialists in psychology and behavior change management to deliver diabetes intervention [26,27], and expert mental health providers are costly scarce and may not have the necessary specialist diabetes knowledge [28]. Physicians are often not trained in effective behavior-change technique and theory [29], although it is not necessary for all the team members of diabetes professionals. This skill is fundamental to the certification of diabetes educators [30]. However, many countries do not have a system of certified diabetes educator to perform advanced and comprehensive diabetes education. Health-care providers with poor teaching skills may have less effectiveness in dietary education. We expect that dietitians who are certified diabetes educators as well could deliver dietary education for patients with diabetes.

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#### Type of educational intervention

There are at least 4 types of approach to deliver patient education. The simple delivery of information regarding the dietary (lifestyle) changes and the most important aspects of the management of the disease is routinely administered during usual care. The information usually is not personalized but quite standard. The second type of education is individual counseling/education which is really permits to fully personalize intervention and create a mutual trust and strong interaction between patient and educator. The third type is group education which may have the benefits of better cost-effectiveness and peer-influences compared to individual education. The fourth type of approach is structured education which has specific characteristics and can be delivered as a group or individual education.

#### ■ Individual vs. Group intervention

A systematic review with meta-analysis evaluated the effects of individual diabetes education on metabolic control, diabetes knowledge and psychosocial outcome. There were 9 studies with 1359 patients included into the analyses. In six studies comparing individual education to usual care, there were no differences between the groups in the improvement of metabolic control at 12 and 18 months [31]. Individual but not group diabetes education gave some additional benefits in psychosocial and behavioral outcomes such as physical component score and recommended food score [31]. Several randomized studies assessed the effects of individual or group diabetes education. A systematic review with meta-analysis that included 11 studies with 1532 people showed that group-based education was able to significantly improve HbA1c, glucose levels, systolic blood pressure, weight, and knowledge of the disease. In addition, a reduced need for medication was observed [32]. The improvement in HbA1c was documented not only in the short-term period (11.4% at 4-6 months) but maintained for 2 years (-1.0%) [32]. A 4-year randomized controlled clinical trial through lifestyle intervention by using group care model for patients with type 2 diabetes found that glycosylated hemoglobin increased in the control group but not in the group of patients ( $p < 0.001$ ). The group care model seems to be cost-effective and successful in improving diabetes managements including knowledge of diabetes, quality of life and health behaviors ( $p < 0.001$ ) [33]. In general, individual

sessions may be more useful than group sessions through an outspoken and confident relationship with patients, and it may be episodically used as well. For group education, it is important to use specific tools to adapt education. A recent meta-analysis including 28 studies showed that a culturally adapted group education was able to decrease HbA1c over a 24-month period [34].

#### ■ Structured group vs. group attention intervention

In a large Chinese cohort of 795 type 2 diabetic patients, the Patients Empower Programme (PEP) has recently shown that a structured education program (including individual and group sessions) may not only improve metabolic outcomes and risk factors, but also reduced all cause mortality and cardiovascular disease [35,36]. Another study tested the efficacy of a structured behavioral intervention on poorly controlled diabetes that subjects attended a 5-session manual-based, educators-led structured group intervention with cognitive behavioral strategies. It was found that this arm was more effective than those in 2 control (individual control and group attention control) arms in improving glycemia in adults with long-duration diabetes [37]. Moreover, structured education should be delivered by expert and trained educators during specific and periodic session. Training for educator should include all the aspects of the education. A meta-analysis showed that the effect on HbA1c was not significant, when physicians delivered the intervention; conversely with nurses and dietitians, the effect sizes were -0.71% and -0.88% respectively [38]. The current available data show the need for testing structured and replicable group approaches with long-term educational multidisciplinary support, based on precise theoretical bases and adapted to different populations and culture [39,40]. Quality programs should be evidence-based and carried out by trained, dynamic and flexible professionals in order to adapt to individual needs and support patients in terms of behavior and practices, beliefs, knowledge, and self-management skills [41].

#### ■ Intensive lifestyle intervention

Intensive lifestyle intervention can also be effective in determining a partial remission of type 2 diabetes. It can cause not only decrease in body weight and HbA1c but also amelioration of concomitant cardiovascular risk factors such

as blood pressure and lipids [42]. Trails have not definitively clarified number and frequency of education sessions and the ideal global contact time between patients and educators. It is likely that sessions should be closer at the beginning of the educational program. A meta-analysis documented that each additional hour of contact time is able to reduce HbA1c by 0.04% [43].

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#### Cultural differences in diabetes education

Recent study identified strategies that could be used to tailor diabetes education to Chinese people lived in three countries (Australia, China and Singapore). It was found that Chinese people tend to rely on self-education for diabetes information and only seek advice and recommendation from health professional as the last resort. In general, they prefer prescriptive concrete instructions rather than more flexible conceptual education [44]. A structured and directive counseling approach is more effective than an autonomy-promoting approach in Chinese people [45].

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#### Modern dietary education tools (using high-tech device)

The use of mobile technology or high-tech device in everyday life continues to increase exponentially. A systematic review identified statistically significant and clinically relevant declines in HbA1c levels for adults receiving telemedicine applications with personalized feedback compared to non-telemedicine treatment approaches [46]. Technology has also been shown to be preferential to weighted food records for recording dietary intake information in people with type 2 diabetes [47].

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#### Conclusion

Patients with diabetes are affected by social, environmental, cultural and personal factors. Regular nutrition educational forums, awareness program and skill training that focus on essential self-care area. The educators should focus on critical factors such as building positive attitudes and the benefits of monitoring the glycemic levels for patients with type 2 diabetes. The success of dietary management requires that the health professions should have an orientation about the cultural beliefs, thoughts, family and communal networks of the patients.

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