

# Evaluation of US Veterans Nutrition Education for Diabetes Prevention

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## ABSTRACT

**Objective:** Evaluate the effectiveness of nutrition education interventions for diabetes prevention.

**Design:** Retrospective cohort design.

**Setting:** Tertiary-care US Veterans' Hospital, July 2007 to July 2012, using pre-existing database.

**Participants:** Prediabetic, adult veterans (n = 372), mostly men (94.4%, n = 351).

**Interventions:** Visits with existing nutrition education classes were collected.

**Main Outcome Measures:** Primary outcome: diabetes status; predictors: visits/encounters, age, body mass index, weight change, and hemoglobin A1c.

**Analysis:** Cox proportional hazards method,  $\chi^2$  test, and logistic regression.

**Results:** In this sample, prediabetic veterans who received nutrition education were less likely to develop diabetes when compared with prediabetic veterans who did not receive nutrition education (hazard ratio, 0.71; 95% confidence interval, 0.55–0.92;  $P < .01$ ). This difference remained significant after adjusting for body mass index and weight change.

**Conclusions and Implications:** Nutrition education was significantly associated with preventing the progression from prediabetes to diabetes in US Veterans participating in a nutrition education intervention at the Michael E. DeBakey Veterans Affairs Medical Center.

**Key Words:** diabetes, prediabetes, nutrition education, veterans (*J Nutr Educ Behav.* 2016;48:538-543.)

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## INTRODUCTION

Diabetes mellitus continues to develop around the world, and its treatment is a growing challenge. Type 2 diabetes is a multi-factorial, complex disease affecting nearly 25.8 million people in the United States, or 8.3% of the population (diagnosed or undiagnosed), and spans all age and ethnic groups.<sup>1</sup> In 2010, approximately 1.9 million people 20 years or older were newly diagnosed with diabetes.<sup>1</sup> Globally, the prevalence of diabetes is estimated to increase from 382 million to 592 million by 2035.<sup>2</sup>

The prevalence of diabetes among veterans is significantly greater than in the general population. One in 5 veterans receiving care from the Veterans Health Administration (VHA) has diabetes, and it is even higher (1 in 4) for veterans belonging to a racial or ethnic minority.<sup>3</sup>

The VHA is the nation's largest integrated healthcare system, operating with 152 medical centers, 819 community-based outpatient clinics,<sup>4</sup> and 9.11 million veterans enrolled. In 2013, there were 86.4 million outpatient clinic visits.<sup>5</sup> This span and influence provides

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a unique opportunity to address major health concerns, and the VHA has responded by developing and implementing programs. A substantial amount of evidence suggests that lifestyle changes can play a pivotal role in diabetes prevention and management. Hence, nutrition education and self-management training programs targeting diet and exercise modifications are ever evolving in an effort to curb the incidence and blunt the long-term effects of diabetes. The major contributions to the development of type 2 diabetes are dietary intake, physical inactivity, and obesity.<sup>1</sup> Prediabetic individuals are at risk of developing type 2 diabetes, and early interventions, such as weight loss and exercise, may reduce their risk by 58% in a research setting.<sup>6</sup> However, whether these effects are seen in real practice is a matter of debate.

This study was a retrospective chart review conducted at the Michael E. DeBakey Veterans Affairs Medical Center (MEDVAMC) and its outpatient clinics, serving approximately 140,000 veterans. Prediabetic patients at the MEDVAMC are typically referred for medical care to an appointment with a Registered Dietitian Nutritionist or 1-hour-long diabetes education classes taught by Certified Diabetes Educators and Registered Dietitian Nutritionists at the discretion of their primary care physician. These classes are based on the American Diabetes Association "Nutrition Therapy Recommendations for the Management of Adults with Diabetes" and include instruction on nutrient-dense eating patterns in appropriate portions to promote a healthy weight and cardiometabolic profile.<sup>7</sup> Nutrition education is provided to build or reinforce nutrition-related knowledge for diabetes prevention and self-management.

The primary objective for this study was to establish the association between attending a nutrition education intervention at the MEDVAMC and progression to diabetes. The hypothesis was that nutrition education prevented or delayed the progression from prediabetes to diabetes.

## METHODS

### Design and Procedure

This study involved a retrospective chart review. The primary outcome

for the study was diabetes status; that is, whether or not prediabetic subjects developed diabetes. The researchers also sought to establish if there was a difference in the rate of progression from prediabetes to diabetes in veterans who attended the existing outpatient nutrition education program compared with veterans who did not attend. The predictors included visits/encounters and the covariates of age, body mass index (BMI), hemoglobin A1c (HbA1c). The database included patients who had prediabetes and were referred to an outpatient nutrition clinic or class between July 2007 and July 2010. Follow-up observation continued until July 2012. The Institutional Review Board at the MEDVAMC, Baylor College of Medicine, and Texas Woman's University approved the protocol.

The same nutrition programs and classes were offered to patients in both of the medical center and outpatient clinics. Nutrition clinics addressed nutrition education in group or individual sessions, typically lasting 1 hour. The frequency of the encounters was a shared decision-making process between the veteran and the Registered Dietitian Nutritionist or medical provider.

Classrooms and individual counseling offices were located in the MEDVAMC or in an outpatient clinic. Classes discussed the pathophysiology and medical nutrition therapy (MNT) of diabetes, including carbohydrate counting, label reading, portion control to lose weight/maintain healthy weight, meal planning, low sodium, and healthy fats. A pre-test and a post-test were given to participants to assess learning. After attending 1 group diabetes class, participants autonomously elected to participate in continued nutrition education or counseling. Individual education was tailored to the veteran's specific needs and knowledge base but included topics similar to those in the group classes. Individual sessions with a Registered Dietitian Nutritionist qualified as MNT because these visits followed the nutrition care process<sup>8</sup> and included a detailed nutrition assessment, diagnosis, and evidence-based interventions to address the nutrition-related problem. The group sessions did not qualify as MNT because the group education provided did not encompass all components of the nutrition care process.

For this study, veterans were categorized into 1 of 2 groups: (1) veterans who received education with 1 or more encounters in a nutrition clinic (attenders) or (2) veterans who were referred to the clinics but did not attend (non-attenders), having a documented cancellation or no-show. The subjects were then analyzed for change in primary diagnosis to diabetes. The observation period was from inclusion to July 31, 2012, with a mean observation period of  $3 \pm 2$  years. Participants with a new diagnosis of diabetes, glucose greater than 200 mg/dL, or HbA1c greater than 6.5% in the observation period were considered to have developed diabetes. The time of developing diabetes was determined by subtracting 2 time points in days (time from their first encounter or referral until the time of diagnosis or July 31, 2012).

### Database

An existing database with 5 years (July 2007–2012) of de-identified patient data from the MEDVAMC was used for the study. Inclusion criteria identified prediabetic veterans who were referred to diabetes nutrition education. Criteria identified glucose levels between 100 and 125 mg/dL or HbA1c between 5.7% and 6.4% at baseline. This study's outcome was development of diabetes in the patients in this retrospective cohort; therefore, diabetic veterans at baseline were excluded. Other exclusion criteria included patients who were prescribed glucocorticoids, diabetic medications such as insulin, oral hypoglycemic agents, and other hypoglycemic agents, phenytoin, and/or epinephrine at baseline. Patients with baseline diagnoses of diabetes, pancreatic cancer, cystic fibrosis, or hemochromatosis, those who had undergone pancreatectomy, or those with random glucose above 200 mg/dL were also excluded. Veterans for which exclusion criteria applied were not included in the original database. This database was created with the US Government computer system VistA. Standardized, automated computer programs extracted variables of individuals meeting search criteria. Demographic and laboratory data collected included age, sex, height, weight, BMI, glucose, and HbA1c. The variables of interest were weight, visits/encounters in specified nutrition clinics, and dates of no-shows.

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