



Evidence Synopsis for the Prevention and Management of Type 2 Diabetes

SUMMARY

This synopsis provides an update on diabetes screening and diagnostic standards and a summary of research studies providing evidence for diabetes prevention and self-management.

Several scientific studies support the effectiveness of lifestyle change interventions, such as the National Diabetes Prevention Program. These interventions have been shown to delay or prevent the onset of type 2 diabetes among overweight or obese adults with blood glucose levels in the prediabetes range. For the process of diabetes self-management, the evidence base is rich and varied; however, research supporting the Diabetes Self-Management Program remains limited. A few representative studies are summarized below.*

BEHAVIORAL HEALTH COUNSELING PROMOTES HEALTHIER LIVING THROUGH DIET AND EXERCISE

A systematic review looking at benefits and harms of behavioral counseling on healthy lifestyle (i.e., diet and physical activity) found evidence that counseling overweight or obese patients with cardiovascular disease risk factors—including impaired fasting glucose—improved cardiovascular intermediate health outcomes, such as low-density lipoprotein (LDL) cholesterol, blood pressure, diabetes incidence and weight outcomes. High-intensity lifestyle counseling reduced diabetes incidence.

Lin JS, O'Connor EA, Evans CV, et al. Behavioral counseling to promote a healthy lifestyle for cardiovascular disease prevention in persons with cardiovascular risk factors: an updated systematic evidence review for the U.S. Preventive Services Task Force. Rockville: Agency for Healthcare Research and Quality. 2014; Evidence Synthesis, No. 113. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK241537>.

CLASSIFICATION AND DIAGNOSIS OF PREDIABETES AND DIABETES MELLITUS

Using a scientific review process to formulate its recommendations, the American Diabetes Association's (ADA) Professional Practice Committee provides annual updates on standards for diabetes screening,

diagnosis and therapy aimed at clinicians, patients and others. Section 2 of its *Standards of Medical Care in Diabetes—2016* discusses diabetes screening, diagnosis and classification criteria and grades the strength of evidence for each recommendation.

American Diabetes Association. Classification and diagnosis of diabetes. Sec. 2. Standards of Medical Care in Diabetes—2016. *Diabetes Care*. 2016;39(Suppl 1):S13-S22.

THE ORIGINAL DIABETES PREVENTION PROGRAM STUDY

A multicenter, randomized controlled clinical trial of 3,234 overweight and obese adults at risk for diabetes showed that weight loss of at least 7 percent combined with a structured intensive behavioral counseling intervention reduced the risk of progression to diabetes by 58 percent over three years compared with a placebo group. Behavioral counseling intervention included eating a low-fat diet and increasing physical activity. This translates to one case of diabetes prevented for every seven adults who received the lifestyle change intervention for three years.

Knowler WC, Barrett-Connor E, Fowler SE, et al. Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med*. 2002;346(6):393-403.

*Literature synopsis adapted with permission from the American Medical Association.

TEN-YEAR OUTCOMES OF THE ORIGINAL NIH-FUNDED DIABETES PREVENTION PROGRAM STUDY

A 10-year follow-up of 2,766 participants from the original NIH-funded research study revealed that diabetes incidence since study randomization in the Diabetes Prevention Program was reduced by 34 percent in the lifestyle group compared with the placebo group. The estimated delay in median time to diabetes diagnosis was four years in the lifestyle group compared with the placebo group.

Knowler WC, Fowler SE, Hamman RF, et al. Diabetes Prevention Program Research Group. 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet*. 2009;374(9702):1677-1686.

THE DIABETES PREVENTION PROGRAM LIFESTYLE INTERVENTION IMPROVED HYPERTENSION CONTROL

An assessment of the impact of the Diabetes Prevention Program lifestyle intervention on hypertension and hyperlipidemia revealed that hypertension control improved significantly, triglycerides decreased significantly and HDL cholesterol increased significantly in the lifestyle intervention group compared with the placebo group, resulting in a greater than 25 percent reduction in medication use for hypertension and hyperlipidemia.

Ratner R, Goldberg R, Haffner S, et al. Impact of intensive lifestyle and metformin therapy on cardiovascular disease risk factors in the Diabetes Prevention Program. *Diabetes Care*. 2005;28(4):888-894.

THE DIABETES PREVENTION PROGRAM INTERVENTION IS COST EFFECTIVE

Using data from the original NIH-funded Diabetes Prevention Program study, researchers used a Markov simulation model to estimate the lifetime cost-utility of the lifestyle intervention program. They found that the lifestyle intervention program was cost-effective in people 45 years or older, and that people 25-44 years old experienced cost-savings. Overall, lifestyle intervention was considered very cost-effective compared with glycemic control management in people who eventually develop diabetes.

Herman WH, Hoerger TJ, Brandle M, et al. The cost-effectiveness of lifestyle modification or metformin in preventing type 2 diabetes in adults with impaired glucose tolerance. *Ann Intern Med*. 2005;142(5):323-332.

WEIGHT LOSS AS A PREDICTOR OF REDUCED DIABETES INCIDENCE

In this secondary data analysis from the original NIH-funded Diabetes Prevention Program study, investigators found that weight loss was the primary predictor of reduced diabetes incidence after looking at the relative contributions of changes in weight, diet and physical activity on the risk of developing type 2 diabetes among participants in the lifestyle intervention group.

Hamman RF, Wing RR, Edelstein SL, et al. Effect of weight loss with lifestyle intervention on risk of diabetes. *Diabetes Care*. 2006;29(9):2102-2107.

IMPACT OF A SPANISH DIABETES SELF-MANAGEMENT PROGRAM

A non-blinded, randomized controlled study of 567 Spanish-speaking adults with type 2 diabetes mellitus found significant improvements in outcomes including hemoglobin A1C and self-efficacy in patients randomized to a Spanish Diabetes Self-Management Program (SDSMP) compared with usual care at six months. After 18 months, patients in SDSMP continued to have improvement in hemoglobin A1C and self-efficacy, but caution should be taken looking at those results because of possible effects from non-completers and lack of control group comparison past six months. Telephone reinforcement of SDSMP did not produce significant improvements in hemoglobin A1C compared with SDSMP patients who did not receive telephone reinforcement.

Lorig K, Villa F, Ritter PL, et al. Spanish diabetes self-management with and without automated telephone reinforcement. *Diabetes Care*. 2008;31(3):408-414.

A DIABETES SELF-MANAGEMENT PROGRAM MAY BE EFFECTIVE

A non-blinded, randomized controlled study of 345 adults with type 2 diabetes mellitus found significant improvements, including in self-efficacy, healthy eating, depression, patient activation and communication with physicians, at six-month and 12-month follow-ups. Of note, hemoglobin A1C did not improve significantly and treatment and control group participants had an average hemoglobin A1C less than 7 at baseline.

Lorig K, Ritter PL, Villa FJ, et al. Community-based peer-led diabetes self-management: a randomized trial. *Diabetes Educ*. 2009;35(4):641-51.