5. Prevention or Delay of Type 2 Diabetes

American Diabetes Association

Diabetes Care 2015;38(Suppl. 1):S31–S32 | DOI: 10.2337/dc15-S008

Recommendations

- Patients with impaired glucose tolerance (IGT) **A**, impaired fasting glucose (IFG) **E**, or an A1C 5.7–6.4% **E** should be referred to an intensive diet and physical activity behavioral counseling program targeting loss of 7% of body weight and increasing moderate-intensity physical activity (such as brisk walking) to at least 150 min/week.
- Follow-up counseling may be important for success. **B**
- Based on the cost-effectiveness of diabetes prevention, such programs should be covered by third-party payers. **B**
- Metformin therapy for prevention of type 2 diabetes may be considered in those with IGT **A**, IFG **E**, or an A1C 5.7–6.4% **E**, especially for those with BMI >35 kg/m^2, aged <60 years, and women with prior gestational diabetes mellitus (GDM). **A**
- At least annual monitoring for the development of diabetes in those with prediabetes is suggested. **E**
- Screening for and treatment of modifiable risk factors for cardiovascular disease is suggested. **B**
- Diabetes self-management education (DSME) and support (DSMS) programs are appropriate venues for people with prediabetes to receive education and support to develop and maintain behaviors that can prevent or delay the onset of diabetes. **C**

LIFESTYLE MODIFICATIONS

Randomized controlled trials have shown that individuals at high risk for developing type 2 diabetes (IFG, IGT, or both) can significantly decrease the rate of diabetes onset with particular interventions (1–5). These include intensive lifestyle modification programs that have been shown to be very effective (~58% reduction after 3 years). Follow-up of all three large studies of lifestyle intervention has shown sustained reduction in the rate of conversion to type 2 diabetes: 43% reduction at 20 years in the Da Qing study (6), 43% reduction at 7 years in the Finnish Diabetes Prevention Study (DPS) (7), and 34% reduction at 10 years in the U.S. Diabetes Prevention Program Outcomes Study (DPPOS) (8). A cost-effectiveness model suggested that lifestyle interventions in the Diabetes Prevention Program (DPP) are cost-effective (9). Actual cost data from the DPP and DPPOS confirm that the lifestyle interventions are highly cost-effective (10). Group delivery of the DPP intervention in community settings has the potential to be significantly less expensive while still achieving similar weight loss (11). The Centers for Disease Control and Prevention (CDC) helps coordinate the National Diabetes Prevention Program, a resource designed to bring evidence-based lifestyle change programs for preventing type 2 diabetes to communities (http://www.cdc.gov/diabetes/prevention/index.htm).

Given the clinical trial results and the known risks of progression of prediabetes to diabetes, people with an A1C 5.7–6.4%, IGT, or IFG should be counseled on lifestyle changes with goals similar to those of the DPP (7% weight loss and moderate-intensity physical activity of at least 150 min/week).

PHARMACOLOGICAL INTERVENTIONS

Pharmacological agents, such as metformin, α-glucosidase inhibitors, orlistat, and thiazolidinediones, have each been shown to decrease incident diabetes to various

Suggested citation: American Diabetes Association. Prevention or delay of type 2 diabetes. Sec. 5. In Standards of Medical Care in Diabetes—2015. *Diabetes Care 2015;38(Suppl. 1):S31–S32*

degrees. Metformin has the strongest evidence base and demonstrated long-term safety as pharmacological therapy for diabetes prevention (12). For other drugs, cost, side effects, and lack of a persistent effect require consideration.

Metformin was less effective than lifestyle modification in the DPP and DPPOS but may be cost-saving over a 10-year period (10). It was as effective as lifestyle modification in participants with BMI $\geq$35 kg/m^2 but not significantly better than placebo in those over 60 years of age (1). In the DPP, for women with a history of GDM, metformin and intensive lifestyle modification led to an equivalent 50% reduction in diabetes risk (13). Metformin may be recommended for very high-risk individuals (e.g., with history of GDM, who are very obese, and/or those with more severe or progressive hyperglycemia).

People with prediabetes often have other cardiovascular risk factors, such as obesity, hypertension, and dyslipidemia, and are at an increased risk for cardiovascular disease events. While treatment goals are the same as for other patients without diabetes, increased vigilance is warranted to identify and treat these and other risk factors (e.g., smoking).

DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT

The standards for DSME and DSMS (see Section 4. Foundations of Care) can also apply to the education and support of people with prediabetes. Currently, there are significant barriers to the provision of education and support to those with prediabetes. However, the strategies for supporting successful behavior change and the healthy behaviors recommended for people with prediabetes are largely identical to those for people with diabetes. Given their training and experience, providers of DSME and DSMS are particularly well equipped to assist people with prediabetes in developing and maintaining behaviors that can prevent or delay the onset of diabetes (14–16).

References

1. 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;346:393–403
2. Buchanan TA, Xiang AH, Peters RK, et al. Preservation of pancreatic β-cell function and prevention of type 2 diabetes by pharmacological treatment of insulin resistance in high-risk hispanic women. Diabetes 2002;51:2796–2803
3. Chiasson J-L, Josse RG, Gomis R, Hanefeld M, Karasik A, Laakso M; STOP-NIDDM Trial Research Group. Acarbose for prevention of type 2 diabetes mellitus: the STOP-NIDDM randomised trial. Lancet 2002;359:2072–2077
4. Lin JS, O'Connor E, Evans CV, Senger CA, Rowland MG, Groom HC. Behavioral counseling to promote a healthy lifestyle in persons with cardiovascular risk factors: a systematic review for the U.S. Preventive Services Task Force. Ann Intern Med 2014;161:568−578
5. Paulweber B, Valensi P, Lindström J, et al. A European evidence-based guideline for the prevention of type 2 diabetes. Horm Metab Res 2010;42(Suppl. 1):S3–S36
6. Li G, Zhang P, Wang J, et al. The long-term effect of lifestyle interventions to prevent diabetes in the China Da Qing Diabetes Prevention Study: a 20-year follow-up study. Lancet 2008;371:1783–1789
7. Lindström J, Ilanne-Parikka P, Peltonen M, et al.; Finnish Diabetes Prevention Study Group. Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. Lancet 2006;368:1673–1679
8. 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;374:1677–1686
9. Herman WH, Hoerger TJ, Brandle M, et al.; Diabetes Prevention Program Research Group. The cost-effectiveness of lifestyle modification or metformin in preventing type 2 diabetes in adults with impaired glucose tolerance. Ann Intern Med 2005;142:323–332
10. Diabetes Prevention Program Research Group. The 10-year cost-effectiveness of lifestyle intervention or metformin for diabetes prevention: an intent-to-treat analysis of the DPP/DPPOS. Diabetes Care 2012;35:723–730
11. Ackermann RT, Finch EA, Brizendine E, Zhou H, Marrero DG. Translating the Diabetes Prevention Program into the community. The DEPLOY Pilot Study. Am J Prev Med 2008;35:357–363
12. Diabetes Prevention Program Research Group. Long-term safety, tolerability, and weight loss associated with metformin in the Diabetes Prevention Program Outcomes Study. Diabetes Care 2012;35:731–737
13. Ratner RE, Christophi CA, Metzger BE, et al.; Diabetes Prevention Program Research Group. Prevention of diabetes in women with a history of gestational diabetes: effects of metformin and lifestyle interventions. J Clin Endocrinol Metab 2008;93:4774–4779
14. Parekh D, Sarathi V, Shivane VK, Bandgar TR, Menon PS, Shah NS. Pilot study to evaluate the effect of short-term improvement in vitamin D status on glucose tolerance in patients with type 2 diabetes mellitus. Endocr Pract 2010;16:600–608
15. Shah M, Kaselitz E, Heisler M. The role of community health workers in diabetes: update on current literature. Curr Diab Rep 2013;13:163–171
16. Heisler M. Overview of peer support models to improve diabetes self-management and clinical outcomes. Diabetes Spectrum 2007;20:214–221