

PREVENTING
Diabetes
IN VIRGINIA
STRATEGIC PLAN



2017 - 2018

Preventing Diabetes in Virginia Strategic Plan was developed by the Project Team of the **Virginia Center for Diabetes Prevention and Education** **University of Virginia**

Joyce Green Pastors, MS, RD, CDE
Hope Warshaw, MMSc, RD, CDE
Anne Wolf, MS, RD
Alexa Painter, MPH

The Preventing Diabetes in Virginia Strategic Plan was supported by a grant that the Virginia Department of Health was awarded from the Centers for Disease Control and Prevention (CDC). Its contents are the sole responsibility of the authors and do not necessarily reflect the official views of the CDC.

All material in this report is in the public domain and may be reproduced or copied without permission. The Virginia Center for Diabetes Prevention and Education appreciates citation and notification of use.

An electronic version of the Preventing Diabetes in Virginia Executive Summary is available at:

<https://med.virginia.edu/vcdpe/diabetes-prevention-programs/>

<http://www.virginiadiabetes.org/>

<http://www.vdh.virginia.gov/diabetes>

If you have questions, please contact the Virginia Center for Diabetes Prevention and Education at jag2s@virginia.edu or the Virginia Diabetes Council at ed@virginiadiabetes.org.

Table of Contents

A Call to Action: Why Does Virginia Need a Plan to Prevent Type 2 Diabetes?	4
Section I. The Faces of Prediabetes in Virginia Today	6
Section II. From Prediabetes to Type 2 Diabetes: Definitions, Prevalence and Costs across US and in Virginia	9
Prediabetes Defined	10
The Progression of Prediabetes to Type 2 Diabetes is a Continuum	10
Prediabetes and Type 2 Diabetes are Common	12
Prediabetes is Serious	13
Prediabetes is Costly	13
Why Should Virginia Address Prediabetes?	14
Section III. The Research Shows We Can Prevent or Delay Type 2 Diabetes	15
Proven Approaches to Prevent or Delay Type 2 Diabetes	15
Translation of US Diabetes Prevention Program into Real World Settings Shows Promise	16
Yes, Diabetes Prevention Programs Are Cost Effective	17
Section IV. National Diabetes Prevention Program and Additional Efforts to Increase Awareness and Coverage within the United States	18
Components of the CDC National Diabetes Prevention Program (NDPP)	19
Description of CDC’s NDPP Diabetes Prevention Recognition Program (DPRP) Process	20
Awareness Campaigns	22
Medicare Adds Diabetes Prevention Program as Preventive Service in 2018	23
Section V. Summary of Formative Research and the Virginia State Engagement Meeting	24
The Formative Research Process and Interviews	24
Key Observations from Formative Research and Interviews	26
Virginia State Engagement Meeting on Prevention of Type 2 Diabetes and the NDPP	29
Section VI. Strategic Plan	32
Section VII. Implementation	36
References	37
Glossary	40
APPENDICES	41
Appendix 1. Research on Prevention of Delay of Type 2 Diabetes	41

List of Tables and Figures

- Table 1. Making the Diagnosis of Prediabetes and Diabetes 13
- Figure 1. Lifetime Risk Management for Developing and Controlling Type 2 Diabetes 15
- Table 2. Number and Percent of People in US with Prediabetes by Age and Gender 16
- Figure 2. Prevalence of Prediabetes from 1999 to 2012 in the US 16
- Figure 3. Average Cost of Prediabetes, Undiagnosed and Diagnosed Diabetes US 18
- Figure 4. Reduction in Risk for Type 2 Diabetes by Percent Weight Loss 20
- Figure 5. Comparison of Weight Loss from DPP Translational Research Studies 21
- Figure 6. Components of the CDC National Diabetes Prevention Program 24
- Table 3. Stakeholder Organizations Interviewed for Formative Research 32
- Table 4. Stakeholder Attendance for the Virginia State Engagement Meeting 30
- Table 5. Stakeholder Interest Area from Virginia State Engagement Meeting 30
- Table 6. Stakeholder Opinions on Challenges of the NDPP Action Plan 31
- Figure 7. Reduction in Risk for Type 2 Diabetes by Percent Weight Loss in Intensive Lifestyle Intervention Arm of DPP 42
- Figure 8. Comparison of Weight Loss from DPP Translational Research Studies to the DPP at 6 and 12 Months 45
- Table 7. Overview of DPP Cost Effectiveness from Health System Perspectiv 46

A Call to Action: Why Does Virginia Need a Plan to Prevent Type 2 Diabetes?

In the US nearly half (48%) of adults are estimated to have either prediabetes, type 1 or type 2 diabetes. Prediabetes is even more common than diabetes. An estimated 86 million Americans, or 1 out of every 3 people, are estimated to have prediabetes – and 9 out of 10 don't know they have it. Nationally, the prevalence of prediabetes is increasing and is strongly associated with the epidemic of obesity.

In Virginia, the statistics are similar. It is estimated that 631,194 or 9% of Virginians have type 1 or type 2 diabetes. That is one out of every 11 people. Approximately, 25% of these individuals are undiagnosed. One out of every three Virginians is estimated to have prediabetes. Most of these individuals are undiagnosed.

In 2010, the US Congress authorized the CDC to establish the National Diabetes Prevention Program (NDPP). The goal of the program is to achieve wide-scale implementation and coordination of a year-long lifestyle change programs to prevent or delay type 2 diabetes across the US. The CDC's strategic approach to the NDPP consists of four components:

- Train the workforce
- Implement a recognition program that will assure quality
- Develop intervention sites that will build infrastructure and provide the program
- Increase referrals to and use of the prevention program

We must achieve an increase in:

- Awareness of prediabetes
- Clinical screening, testing, and referral to CDC's recognized lifestyle change program (LCP)
- Reimbursement/coverage for the CDC-recognized lifestyle change programs
- Availability of and support for CDC-recognized lifestyle change programs

Virginia's Plan for Well-Being is a call to action for all Virginians to work together to make Virginia the healthiest state in the nation. The call to action for preventing diabetes in Virginia parallels many of these specific goals, including attaining healthier eating and physically active lifestyles.

Let's get started!



Section I. The Faces of Prediabetes in Virginia Today

Frank, Age 52

Frank just doesn't feel well. He knows he has high blood pressure and is overweight. His father and aunt have type 2 diabetes. Frank is concerned about his risk for type 2 diabetes so he asks his family physician to check him for diabetes at his annual physical. His doctor tells him that his A1C is 6.1% and that he has prediabetes. He encourages Frank to lose weight by saying, eat healthier and exercise. But, Frank leaves his doctor's office unsure of how to take action.

Six months later, Frank is still not feeling well. He hasn't lost any weight. He tried to start running but his job got busy and he didn't have enough time to exercise. He knows he needs help. Frank considers enrolling in the wellness program at work but learns there is no specific program for prediabetes. They offer a commercial weight loss program and gym memberships at a discounted rate but that doesn't feel like the type of support he needs to make lasting changes. Frank feels defeated and takes no actions.

Two years later, Frank has gained ten more pounds. He is not exercising and has not made any changes in his eating habits and food choices. He knows he needs help. He calls his health insurance plan to see if he can set up an appointment with a Registered Dietitian Nutritionist (RD/RDN) for prediabetes but they tell him he is only covered for this service if he is diagnosed with diabetes.

Three years later, Frank's physician checks his A1c. It's now 6.6%. Frank is now diagnosed with type 2 diabetes.

Nala, Age 36

Nala has two children. During her first pregnancy, everything went fine and she delivered a robust 10-pound baby boy. During her second pregnancy, Nala was diagnosed with gestational diabetes mid-way through her pregnancy. She had never been able to lose the extra weight she gained during her first pregnancy.

Before she got pregnant the second time, her primary care provider (PCP) told her that her weight for her height puts her in the category of being obese. She knew she was overweight but she didn't feel obese. She looked like most of her colleagues at work-how so how could she be "obese"? Her PCP recommended that she exercise at the local YMCA and try a commercial weight control program.

Nala tried to incorporate a healthy eating plan and physical activity into her lifestyle but it was a challenge. She works full time and her beautiful baby boy was now a full fledged toddler. She thought she was busy and "active enough" just running after him.

Nala went back to her life as usual and didn't think about it until she got pregnant the second time during which she was diagnosed with gestational diabetes. This diagnosis and how it could impact her baby motivated Nala. She began leaving work on time so that she could go for a walk before dinner. She saw a Certified Diabetes Educator (CDE) who taught her how to take simple steps to make healthier food choices and eat smaller portions to control her blood glucose. She felt much healthier and was able to keep her blood glucose levels under control through the remainder of her pregnancy and didn't need to take insulin.

Once her daughter was born, her blood glucose levels at her post-pregnancy visit were in the normal range. Busy with work, family and two young children, Nala slowly went back to her old eating and physical activity habits. She slowly gained 14 pounds over the next three years. At age 36 during her annual checkup, her PCP told her that her fasting blood glucose level indicated that she has prediabetes.

Matias, age 62

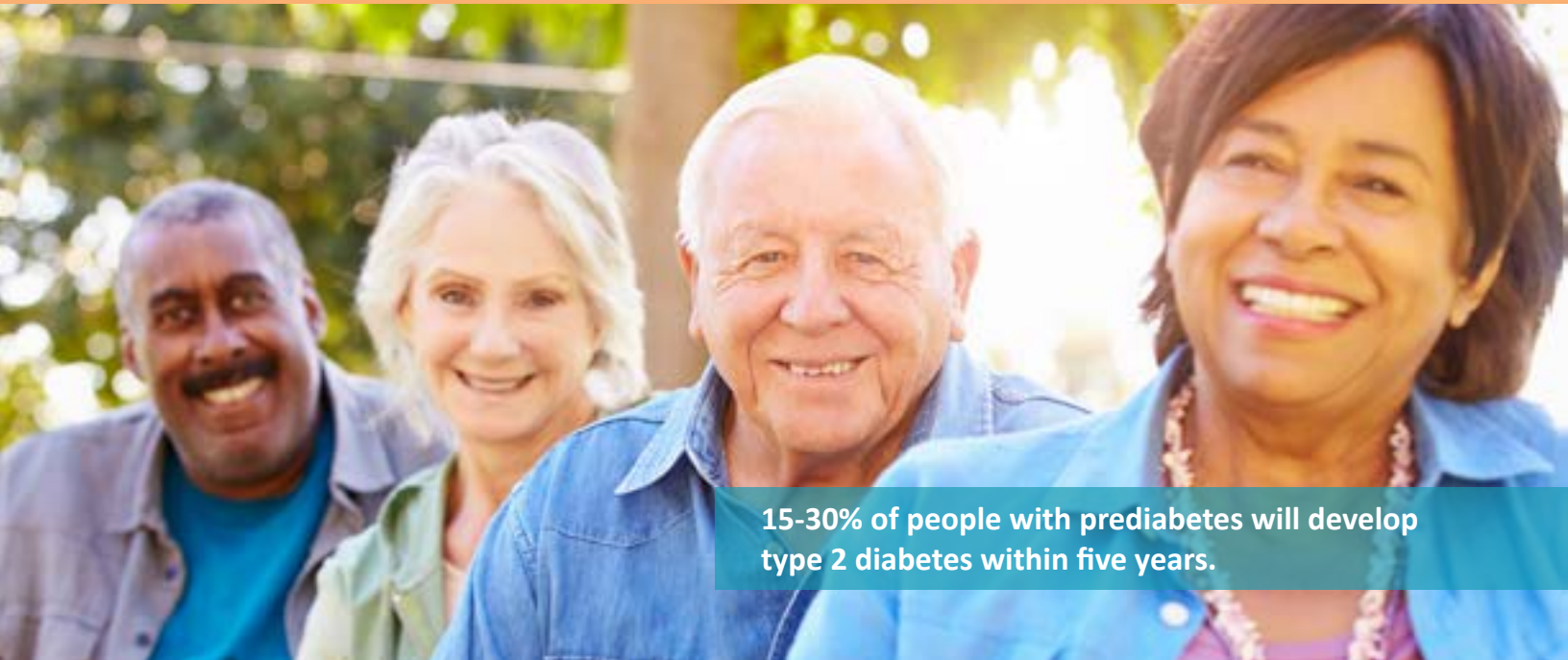
Matias is happy and proud of his family. He has raised three beautiful daughters and one son. He is happily married to his wife of 37 years, Valentina and he runs a successful insurance company. Family and work have meant everything to him and now he is thinking about retirement and his "next phase of life."

Looking forward to his future, he decides to go to a health screening at his church. They are screening for high blood pressure, diabetes and blood cholesterol levels. Matias knows he has not lived a healthy lifestyle. He has gained 45 pounds over his adult life, he sits for 10-12 hours a day at work and he eats whatever he wants. Enjoying regular restaurant meals is special to him and his way for treating himself for "making it." But he believes that he is strong and healthy, certainly healthier than his brother who was diagnosed with type 2 diabetes five years ago.

At the screening, they tell Matias that he may have prediabetes and that he should follow up with his doctor. He goes to his doctor and she confirms the diagnosis with a blood test. Dr. Calle explains to Matias that his weight is a risk factor for type 2 diabetes. If he does nothing, he will likely develop type 2 diabetes within a few years. But she goes on to tell him that if he makes some changes in his food choices and eating habits and starts to take regular walks and loses around 15 pounds that he can prevent or delay the progression to type 2 diabetes. She recommends that he go to a CDC-recognized lifestyle change program (LCP) at a community health clinic.

Matias is gladly and gratefully attending the lifestyle change program. It is a year-long program with a knowledgeable and fun leader, the group is supportive and he starts changing the way he eats and becomes more active. He loses 15 pounds. His family even begins to adopt some of his new eating and activity patterns. He feels better than he has in 10 years and his blood glucose levels are now back in the normal range.

Frank, Nala and Matias are the faces of prediabetes in Virginia today. They are hardly alone.

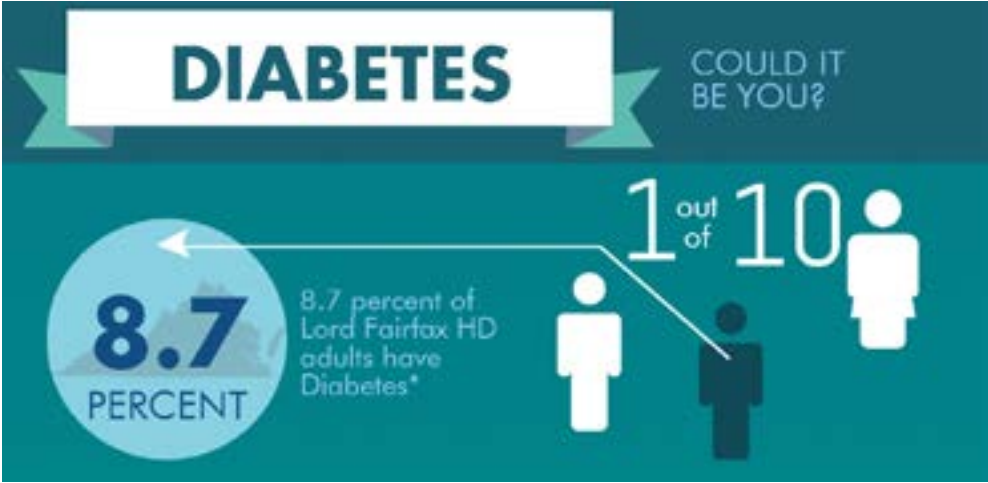


15-30% of people with prediabetes will develop type 2 diabetes within five years.

Many Virginians as well as their healthcare providers are unaware that they currently are at high risk for or have prediabetes. Therefore, this condition goes undiagnosed and untreated until it progresses to type 2 diabetes. According to the Centers for Disease Control and Prevention (CDC), 9 out of 10 people with prediabetes are unaware that they have it.¹

To help Virginians prevent or delay the onset of type 2 diabetes, we must achieve an increase in:

- Awareness of prediabetes by people and healthcare providers
- Clinical screening, testing, and referral to CDC-recognized lifestyle change programs
- Coverage for CDC-recognized lifestyle change programs
- Availability and support for CDC-recognized lifestyle change programs





The Strategic Plan for Diabetes Prevention provides a framework for the next two years.

Section II. From Prediabetes to Type 2 Diabetes: Definitions, Prevalence and Costs across US and in Virginia

With the rising rates of people who are overweight or obese and/or living with one or more chronic diseases and the escalating healthcare costs of managing these conditions, such as type 2 diabetes, attention is increasingly on prevention of these chronic diseases. The evidence about our ability to prevent or delay the diagnosis of type 2 diabetes in individuals at high risk for or diagnosed with prediabetes is clear based on several decades of research in the US and globally.^{2,3,4} The evidence, from clinical trials and translational research, shows prevention of type 2 diabetes can be accomplished with a 5-7% weight loss, healthier food choices and eating habits and regular, sufficient physical activity.

The challenge now is how can we collectively identify the citizens of Virginia at high risk of type 2 diabetes or with prediabetes and determine the optimal ways to enroll them in and deliver the year-long CDC-recognized lifestyle change program (LCP) with the goal of preventing or delaying the progression to type 2 in as many people as possible.



Prediabetes Defined

Prediabetes is when blood glucose levels are higher than normal but not yet high enough to be diagnosed as type 2 diabetes. People diagnosed with prediabetes do not typically have related symptoms. Blood glucose levels can be slightly elevated for years while damage is being done to the body’s tissues and organs. People diagnosed with prediabetes should have their blood glucose or A1c level checked annually to determine if their prediabetes has progressed to type 2 diabetes.¹

Table 1. Making the Diagnosis of Prediabetes and Diabetes

	Normal	Prediabetes	Diabetes
HbA1C	< 5.7	5.7 – 6.4%	≥ 6.5%
Fasting Plasma Glucose	< 100 mg/dL	100 – 125 mg/dL	≥ 126 mg/dL
Two–Hour Oral Glucose Tolerance Test		140 – 199 mg/dL	≥ 200 mg/dL

ADA Standards of Medical Care in Diabetes. *Diabetes Care* 2016;39(suppl. 1):S13-S22.

Notes: Not for diagnosis of GDM. If results from one test are not convincingly indicative of the diagnosis, then a repeat test should be done on a different day.

The Progression of Prediabetes to Type 2 Diabetes is a Continuum

The development of prediabetes or type 2 diabetes requires a person to have several risk factors (Figure 1) including a family history of type 2 diabetes, age, race/ethnicity, previous diagnosis of gestational diabetes in women, BMI that indicates being overweight, and lack of physical activity.⁵ With these risk factors and a genetic disposition, hormonal and metabolic changes over time trigger insulin resistance and chronic inflammation. Insulin resistance is the body’s inability to effectively use the insulin it makes in the pancreatic beta cells. In response and over time the beta cells go into overdrive and produce an increasing supply of insulin with the goal of maintaining normal glucose levels as long as possible. Concurrently, the body’s insulin supply dwindles to the point that there is no longer enough insulin to maintain normal glucose levels. Glucose rises higher than normal and into the prediabetes range—or, if not detected early, the diabetes range (Table 1). Insulin resistance and chronic inflammation also commonly cause hypertension and abnormal lipid levels (low HDL, unhealthy LDLs and elevated triglycerides), putting these individuals, who are often overweight or obese at significantly higher risk for strokes and heart attacks.

Attention to and detection of prediabetes is relatively recent. This increased attention has been fostered both by research conducted globally as well as the twin epidemics of obesity and type 2 diabetes. It is critical for the well-being of Virginians, as well as to control healthcare expenditures, that we foster the early detection of people at high risk for type 2 diabetes or with prediabetes and enroll them in an available CDC-recognized lifestyle change program (LCP) to assist their efforts to achieve and maintain weight loss through healthy eating and physical activity.

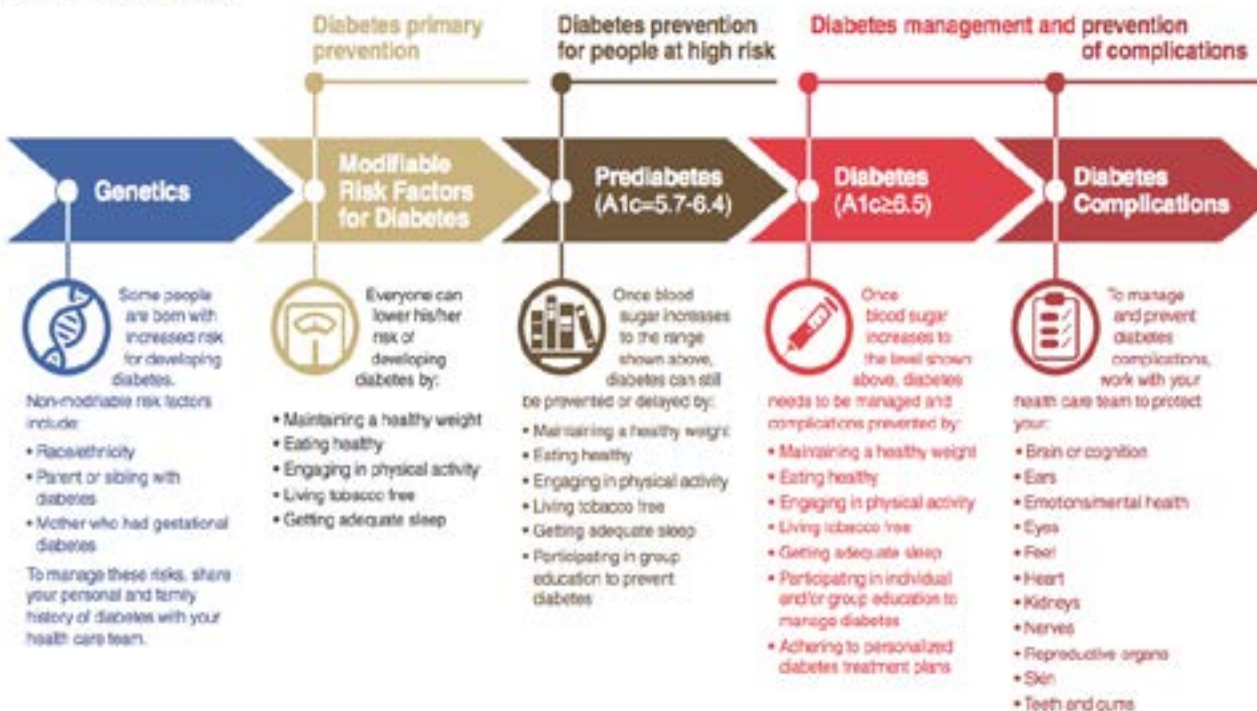
Research shows that early detection of prediabetes and early engagement of individuals in an effective treatment program can prevent or delay the progression to type 2 diabetes.^{2-4, 6} This effort can also decrease the incidence of or improve the outcomes of other weight related conditions prevalent in people at high risk for or with prediabetes. It can also increase the quality of life and productivity of Virginians as well as save precious healthcare dollars.

Preventing or delaying the progression of prediabetes to type 2 diabetes is a continuum as is the transition from newly diagnosed diabetes to developing one or more complications of many years with uncontrolled diabetes. Therefore, as depicted in Figure 1, the need for intervention and support is needed by individuals along the continuum to manage lifetime risk. Research demonstrates that early intervention paired with preventive efforts can prevent or delay the progression of this continuum.

Figure 1. Lifetime Risk Management for Developing and Controlling Type 2 Diabetes

Lifetime Risk Management for Developing and Controlling Type 2 Diabetes

The risk of developing diabetes increases with age.



Note: Figure 1 is used with permission from the North Carolina Diabetes Advisory Council. It appears in North Carolina’s Guide to Diabetes Prevention and Management 2015-2020 found at: http://www.diabetesnc.com/downloads/1215/NCsGuideToDiabetesPreventionandManagement2015-2020_FINAL.PDF

Prediabetes and Type 2 Diabetes are Common

United States Prevalence

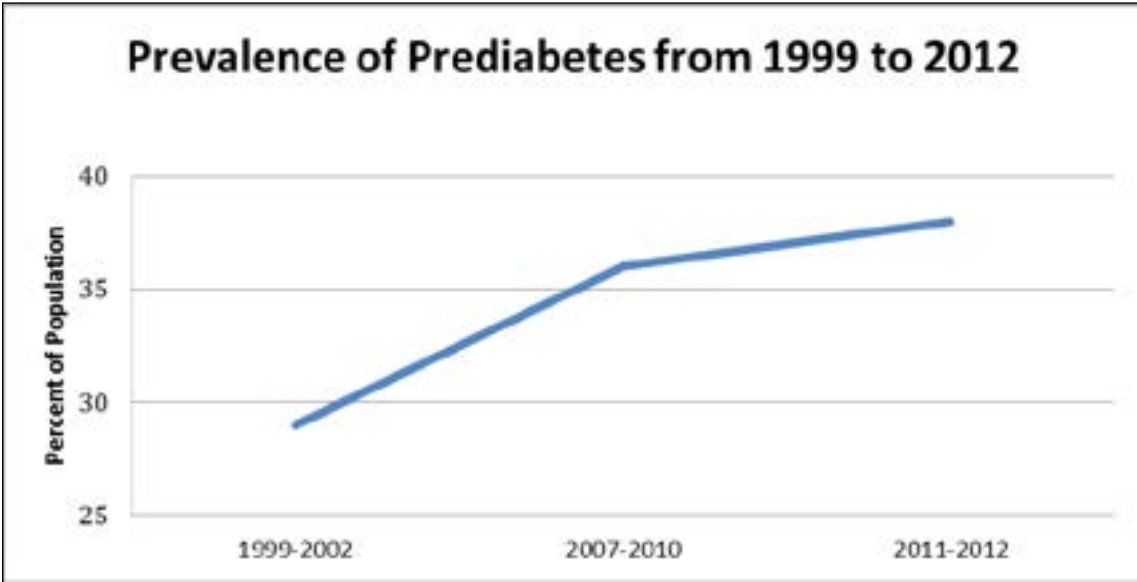
In the US nearly half (48%) of adults are estimated to have either prediabetes, type 1 or type 2 diabetes.⁷ Prediabetes is even more common than diabetes. An estimated 86 million Americans, or 1 out of every 3 people, are estimated to have prediabetes.¹ Prediabetes is present in approximately 23% of adults under 34 years of age and 50% of adults 65 years or older.⁷ Prediabetes is also more common in men (Table 2) and was similar for non-Hispanic whites (35%), non-Hispanic blacks (39%), and Hispanics (38%).⁸ Nationally, the prevalence of prediabetes is increasing (Figure 2) and is strongly associated with the epidemic of obesity.⁸ Of the 86 million Americans estimated to have prediabetes, 9 out of 10 don't know they have it.¹

Table 2. Number and Percent of People in US with Prediabetes by Age and Gender

Total	Number with Prediabetes (millions)	Percentage with Prediabetes
20 years or older	89.3	38%
By age		
20-44	29.6	28.2%
45-64	37.1	44.9%
65 years or older	21.4	49.5%
By sex		
Men	45.7	40.1%

Note: Menke A et al. JAMA 2015;314:1021-29 (table 1, and applied prevalence to 2012 census data from CDC).

Figure 2. Prevalence of Prediabetes from 1999 to 2012 in the US



Menke A et al. JAMA 2015;314:1021-29

Virginia Prevalence

In Virginia, the statistics are similar. It is estimated that 631,194 or 9% of Virginians have type 1 or type 2 diabetes. That is one out of every 11 people. Approximately, 25% of these individuals are undiagnosed.^{9,10} One out of every three Virginians is estimated to have prediabetes. Most of these individuals are undiagnosed.¹⁰

Prediabetes is Serious

Prediabetes is serious. If untreated, 15-30% of people with prediabetes will develop type 2 diabetes within five years.⁵ However, and importantly, the progression to type 2 diabetes can be prevented or delayed with modest weight loss (and maintenance of that weight loss), engagement in at least 150 minutes of physical activity per week and healthier eating habits and food choices.

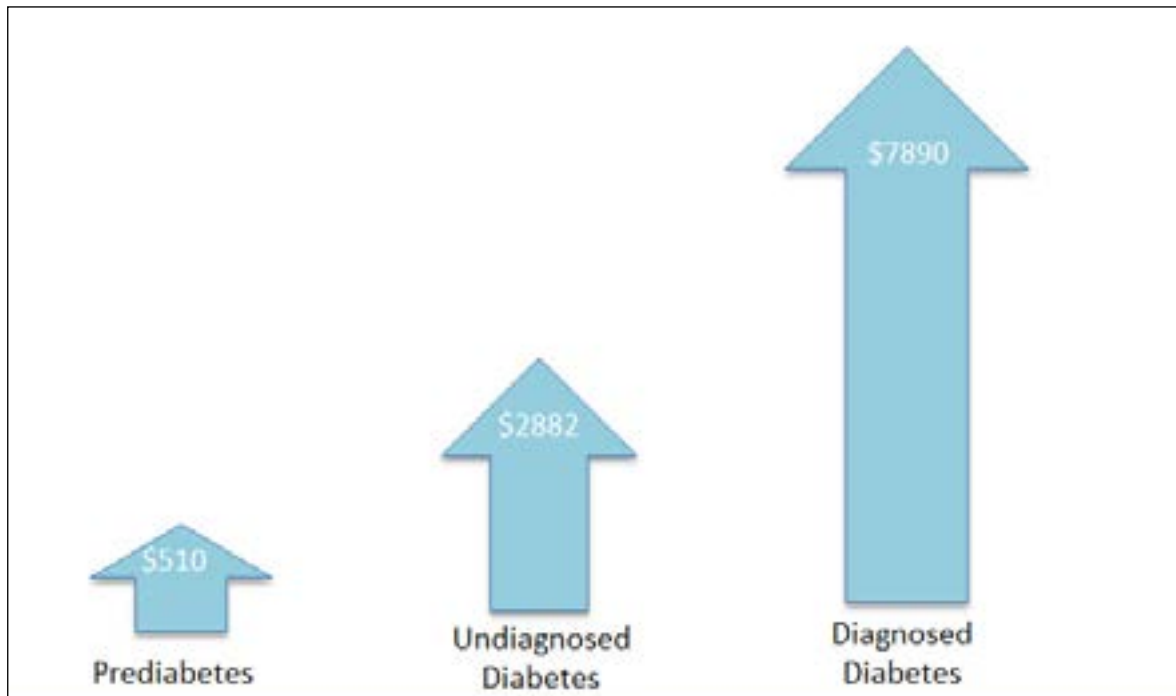
Diabetes was the seventh leading cause of death in the US in 2010.⁵ Diabetes can affect nearly every organ and system of the body. Complications of diabetes include heart disease, stroke, blindness, end-stage kidney disease and lower extremity amputation. Hence the toll of diabetes and its potential complications on a person's well-being and quality of life as well as their families, can be enormous.

Prediabetes is Costly

The annual medical cost of prediabetes in 2012 was \$44 billion.⁷ Adults with prediabetes incur 1.8 times the annual number of ambulatory visits for diabetes complications and 1.5 times the number of visits for hypertension compared to a similar population without prediabetes.⁷ The average per person medical cost increases dramatically from prediabetes to diabetes in most part due to disease progression and the onset of chronic complications (Figure 3).

Prediabetes cost the state of Virginia an estimated \$1.1 million in 2012.⁷ Given the high cost of diabetes complications and cost- and clinical-effectiveness of primary prevention efforts, it is imperative that the state of Virginia encourage its citizens to learn how to live a healthy lifestyle to prevent or delay the progression of type 2 diabetes.

Figure 3. Average Per Person Cost of Prediabetes, Undiagnosed and Diagnosed Diabetes in the United States, 2012



Dall TM, et al. Diabetes Care 2014;37:3172-79.

Why Should Virginia Address Prediabetes?

Simple. Because an extensive body of research that spans over 30 years demonstrates conclusively that efforts to prevent type 2 diabetes are cost-effective and clinically-effective. These efforts decrease the incidence of prediabetes and type 2 diabetes and the related chronic complications potentially incurred with years of uncontrolled diabetes. This research, completed across the globe in a variety of populations using a variety of programs, demonstrates that the diagnosis of type 2 diabetes can be prevented or delayed in high-risk individuals.

Section III. What The Research Shows

Proven Approaches to Prevent or Delay Type 2 Diabetes

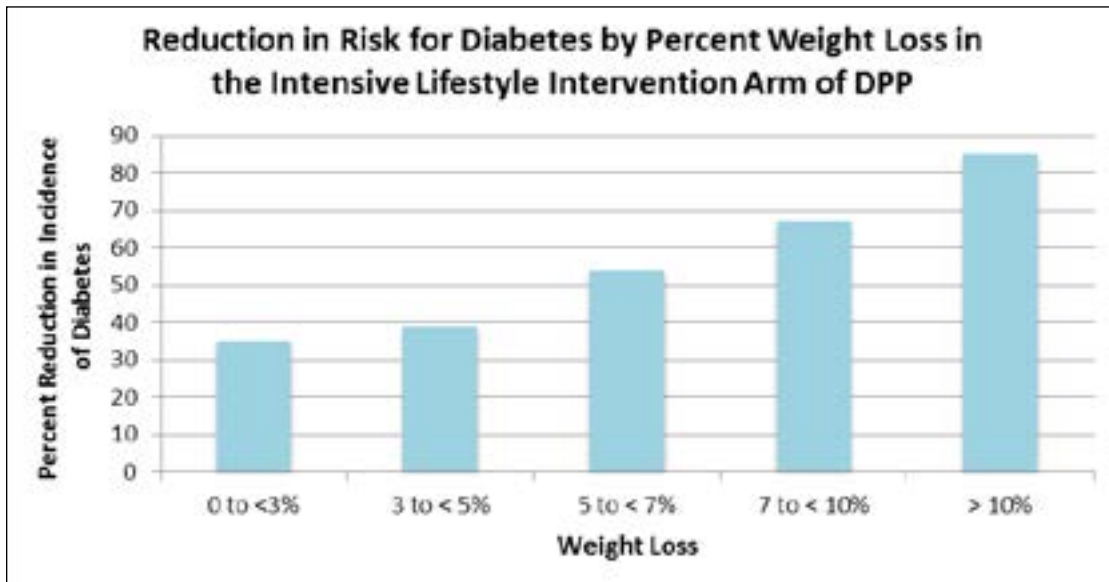
Over the past 25 years, research studies aimed at preventing or delaying the onset of type 2 diabetes have been conducted in the United States and the globe including in China, Finland, India and Sweden. These studies have been conducted in a variety of cultures and high risk populations such as American Indians and Hispanic women with a history of gestational diabetes. The overwhelmingly consistent results from all of these intervention studies unequivocally demonstrate that intensive lifestyle change for people at high risk for or with prediabetes effectively prevents or delays the development of type 2 diabetes by 45-58%.^{2-4, 6} Long-term follow up studies of several of these populations, ranging from 15 to 23 years, indicate a continued reduction in the incidence of type 2 diabetes, as well as reductions in microvascular disease, cardiovascular disease and all-cause mortality among certain populations.¹¹⁻¹⁷ A more thorough review of this body of research can be found in Appendix 2.

The large-scale studies that implemented an intensive lifestyle intervention generally implemented a core set of goals including:

- Weight loss of at least 5-7% and the goal of maintaining maximal weight loss
- Healthy eating pattern (similar to the healthy eating recommendations in the US Dietary Guidelines for Americans)¹⁸⁻¹⁹
- Engagement in regular physical activity (at least 150 minutes of aerobic activity/week)
- Increased number and frequency of visits

The large research study in the United States, the Diabetes Prevention Program (DPP) and its long-term follow up study, the Diabetes Prevention Program Outcome Study (DPPOS), confirmed that the amount of weight loss and the ability to maintain the maximum weight lost was the primary predictor in reducing the incidence of developing type 2 diabetes. This ranged from a 35% reduction among participants with 0-3% weight loss to an 85% reduction in participants with greater than 10% weight loss (Figure 4). For each two pounds of weight loss participants in the DPP experienced a 16% reduction in the development of type 2 diabetes. Furthermore, achieving the daily physical activity goal helped individuals maintain the weight loss they achieved and served an even more critical role in maintaining the weight loss.^{20,21}

Figure 4. Reduction in Risk for Type 2 Diabetes by Percent Weight Loss in Intensive Lifestyle Intervention Arm of DPP.



From Maruthur N, et al Journal of general internal medicine. 2013;28(12):1629-1636.

Translation of US Diabetes Prevention Program (DPP) into Real World Settings Shows Promise

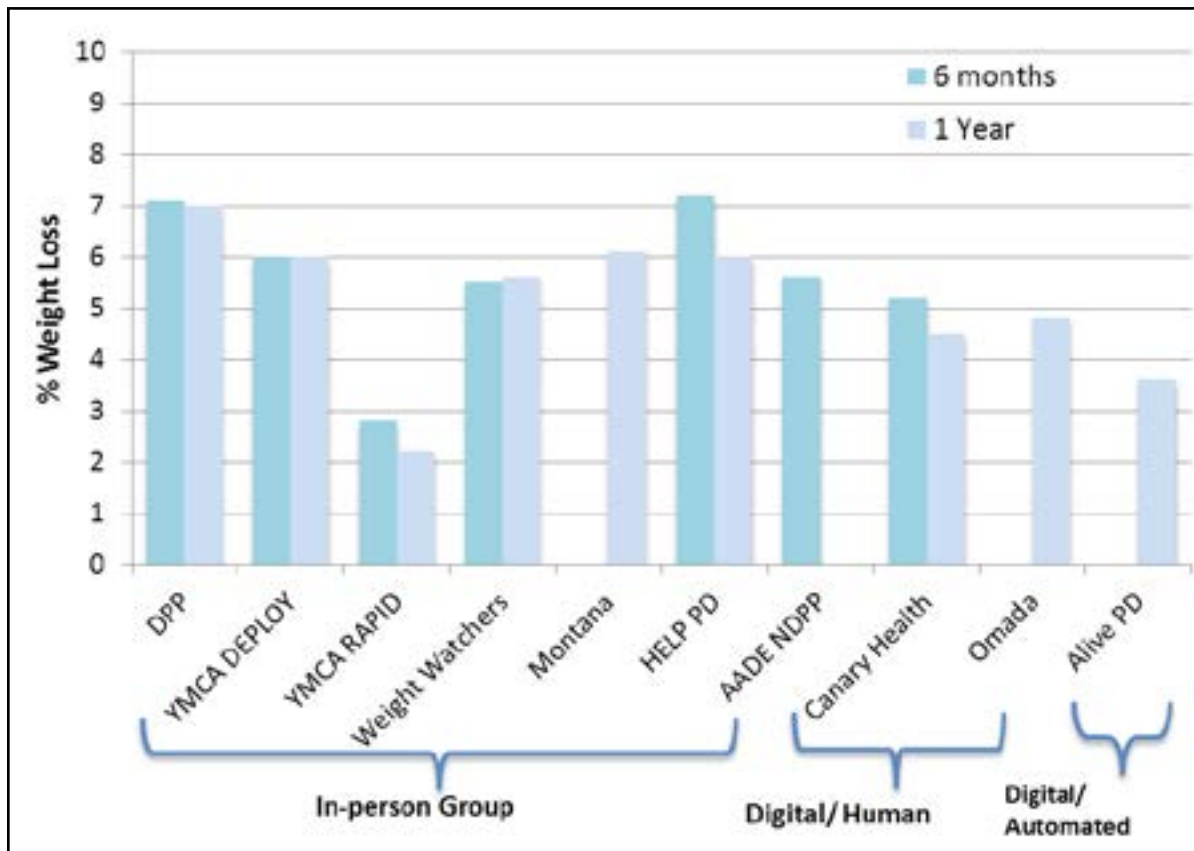
With the positive evidence from the myriad type 2 diabetes prevention studies the next line of investigation was to determine whether these results could be translated to real world settings. Since the mid 2000’s more than 50 studies have tested a variety of settings and means to deliver the program.

A systematic review by the Community Preventive Services Task Force (CPSTF) summarized the results of 53 studies and 66 intensive lifestyle intervention programs published through 2015.²² The results showed that:

- Healthier eating patterns and regular physical activity reduced type 2 diabetes incidence by 41% compared with usual care
- The average reduction in body weight was 2.2% and fasting plasma glucose by 2.2 mg/dL
- Participants lost more weight and were less likely to develop type 2 diabetes in more intensive programs, those with greater frequency of visits, inclusion of individual sessions, and use of additional personnel
- Participants in the intensive lifestyle intervention groups also experienced reductions in blood pressure and improvements in cholesterol measures that may translate into additional benefits in the long-term prevention of cardiovascular disease^{6,12}

In 2016, the Institute for Clinical and Economic Review (ICER) evaluated the effectiveness and value of a range of type 2 diabetes prevention programs that had obtained pending or full recognition as a CDC-recognition lifestyle change program.²³ ICER reported that in-person group counseling was the most common mode for delivery. Their evaluation agrees with the CPSTF’s summary detailed above that greater weight loss was observed in programs that provided personal, more frequent contact.²² ICER also reported that there was greater weight loss in face-to-face versus digital contact. However, if the digital program used a human coaching design, the net benefit was better than with a fully automated program.

Figure 5. Comparison of Weight Loss from DPP Translational Research Studies to the DPP at 6 and 12 Months



Adapted from Institute for Clinical and Economic Review, <http://icer-review.org> and DiBenedetto JC, et al. The Diabetes Educator Online doi:10.1177/0145721716668415

Yes, Diabetes Prevention Programs Are Cost Effective

The findings from the CPSTF²², ICER²³, the US DPP/DPPOS study¹⁷ and all translational diabetes prevention programs that provide cost information demonstrate that these programs are very cost effective. The average incremental cost effectiveness ratio reported in the CPSTF review was \$13,761 per Quality Adjusted Life Years (QALY). The interquartile range was between \$3067 to \$21,899.²²

The ICER report concludes the following:²³

- In-person DPP delivered individually is cost effective
- In-person DPP delivered in a group was most cost effective
- DPP adapted to a digital platform with a human coach is cost effective but based on fewer studies
- Unable to calculate cost effectiveness of fully digital programs due to insufficient research at this point

Section IV. National Diabetes Prevention Program and Additional Efforts to Increase Awareness and Coverage within the United States

In 2010, the US Congress authorized the CDC to establish the National Diabetes Prevention Program (NDPP).³⁵ The capacity to build the NDPP was fostered through grants from CDC which began in 2012. CDC awarded \$6.75 million in grants under Prevention and Public Health funds (termed 1212 funding).³⁶ The intent of these funds was to expand the reach of the NDPP and engage a variety of organizations in developing distinctly differently models to build capacity to deliver the NDPP. Funding was awarded to six organizations based on the number of qualified applicants, the scope of the proposals, and geographic reach. The awards were for a five-year period. Additional funds have been extended to these awardees through CDC's fiscal year of 2017 to 2018.

The awardees were:

- American Association of Diabetes Educators
- America's Health Insurance Plans
- Black Women's Health Imperative
- National Association of Chronic Disease Directors
- United Healthcare and Optum Health Care Solutions
- Y's of the USA

Examples of two grantees efforts to enhance capacity:

America's Health Insurance Plans (AHIP): Four members of AHIP – Denver Health, EmblemHealth, Florida Blue, and Molina Healthcare have implemented the CDC-recognized lifestyle change program for a diverse group of individuals at risk for prediabetes. Efforts have focused on engaging diverse populations through the use of culturally and linguistically appropriate resources (e.g., through the use of bilingual outreach workers and coaches, addressing the needs of low income and low literacy populations by offering materials at 4th or 6th grade reading levels). Other areas of focus include offering DPPs in workplace settings, leveraging partnerships with physician practices to increase referrals and using health plan retail centers (walk-in customer service locations) to increase access.

American Association of Diabetes Educators (AADE): This professional association representing diabetes educators developed a model to train and utilize diabetes educators as well as supervised and trained diabetes paraprofessionals to deliver the CDC-recognized lifestyle change program within the structure of existing recognized or accredited Diabetes Self-Management Education and Support (DSMES) programs. These programs are typically located within a healthcare system or medical center. Over the ensuing years AADE has, with this CDC funding, worked with their members, DSMES sites and various partners to develop about 45 sites across 16 states with high concentration of programs in states with high rates of prediabetes/type 2 diabetes. A recent publication describes the programs and their positive results.²⁹

In 2013, CDC awarded 1305 grant funding to all 50 states and Washington D.C. to raise awareness among those at risk of prediabetes and increase referrals to CDC-recognized lifestyle change programs.³⁶ Two other goals were to work with State Employee Benefit Plans and Medicaid to support coverage and promote reimbursement. Virginia received both basic and enhanced awards under the 1305 funding announcement, which allocated over \$900,000 annually for diabetes efforts.

In 2014, CDC awarded 1422 grant funding to 17 states and 4 cities to expand on work started by the 1212 and 1305 grants.³⁶ This funding was provided to health departments to prevent obesity, diabetes, heart disease, and strokes. The purpose of this funding was to enroll high-risk and vulnerable populations in a CDC-recognized lifestyle change program. Virginia was one of 17 states funded and this funding was given to five health districts including Crater, Lord Fairfax, Portsmouth, Prince William, and West Piedmont. With the 1422 award, Virginia received an additional \$1.3 million dollars to support diabetes state and local initiatives.

Components of the CDC National Diabetes Prevention Program (NDPP)

The NDPP is more than a program. Its foundation is a results-driven partnership that includes community-based organizations, public and private insurers, employers, healthcare systems, academia, state and local health departments, and government agencies. The goal of the program is to achieve wide-scale implementation and coordination of year-long lifestyle change programs to prevent or delay type 2 diabetes across the US. The CDC’s strategic approach to the NDPP is summarized in Figure 6:

Figure 6. Components of the CDC National Diabetes Prevention Program



CDC NDPP. <http://www.cdc.gov/diabetes/prevention/index.html>

1. **Training:** Train community and health related organizations to initiate and implement the lifestyle change program effectively. The CDC established the Diabetes Training and Technical Assistance Center (DTTAC) at Emory University to provide comprehensive Lifestyle Coach training for coaches to effectively deliver the program. At present other organizations, including the Virginia Center for Diabetes Prevention and Education at the University of Virginia, now conducts Lifestyle Coach trainings in accordance with CDC standards.
2. **Recognition Program:** Ensure quality and adherence to proven standards. The CDC-Diabetes Prevention Recognition Program (DPRP) is a key component of the NDPP. CDC is responsible for the DPRP and there is no cost to apply.³⁷

Description of CDC's NDPP Diabetes Prevention Recognition Program (DPRP) Process

The CDC established the Diabetes Prevention Recognition Program (DPRP) to identify programs with proven effectiveness at delivering the year-long NDPP.³⁷ The goals of the DPRP are to assure quality and adherence to proven standards, to maintain a registry of such organizations, and to provide technical assistance to local CDC-recognized lifestyle change programs.

The first step in the process is to submit an application for what's referred to as pending recognition. This is an online application that involves providing the name and address of the organization, primary contact, data preparer, type of curriculum to be used, and agreement to comply with requirements for recognition including submission of data.

The CDC-DPRP standards require that the program include:

- Use of a CDC-developed or approved curriculum
- Ability to begin offering the lifestyle program within 6 months of receiving pending status from CDC
- Capacity and commitment to deliver the year-long program, including at least 16 sessions during the first 6 months and at least 6 sessions during the last 6 months
- Ability to submit data on participants' progress—including attendance, weight loss, and physical activity—every 12 months
- Trained lifestyle coaches who can help participants build their skills and confidence to make lasting healthy lifestyle changes
- Designated individual(s) to serve as the diabetes prevention program coordinator
- 50% of participants diagnosed with prediabetes through blood testing (or have a history of gestational diabetes)

To obtain what's referred to as full program recognition, the program must submit data every 12 months and to meet the following goals:

- Maintenance of 5% weight loss
- Tracking of physical activity
- Attendance at a minimum of 9 sessions during first 16 weeks of program

For more information about the DPRP or to apply for recognition go to <http://www.cdc.gov/diabetes/prevention/recognition>.

3. **Intervention Sites:** Deliver CDC-recognized lifestyle change programs nationwide. The CDC-recognized lifestyle change programs are now offered at many locations, including community-based organizations, worksites, and healthcare facilities.

Requirements of the CDC-Recognized Lifestyle Change Program

The required components of the lifestyle change program include:^{35,37}

- Use of a CDC-approved curriculum (described below) for the year-long program
- Use of trained lifestyle coaches as facilitators

Description of the CDC-Approved Lifestyle Change Program Curriculum

CDC published the first NDPP curriculum in 2012. PDF files are available on CDC's website for downloading or printing at no charge. In 2016, a new curriculum, titled *Prevent T2*, was released by the CDC.³⁵ This version is more colorful, has a more user-friendly format, and is at a lower reading level. This curriculum is on CDC's website for downloading or printing at no charge. It includes a guide for the lifestyle coach as well as a participant guide.

CDC also allows organizations applying for DPRP to submit and use their own curriculum as long as it is reviewed by CDC and approved for use.³⁷ There are 26 modules in the 2016 curriculum and 22 of them must be completed within the 12-month program.

The group-based format can be delivered in person or virtually. The focus of the program is to individualize the curriculum with the group to make positive lifestyle changes rather than completing all of the modules of the curriculum. To be eligible to participate in a CDC-recognized lifestyle change program, participants must:³⁵

- Be at least 18 years of age
- Be overweight (body mass index greater than or equal to 24 or greater than or equal to 22 if Asian)
- Have no previous diagnosis of type 1 or type 2 diabetes
- Have a blood test result in the prediabetes range within the past year:
 - Hemoglobin A1C: 5-7% - 6.4%; or
 - Fasting plasma glucose: 100-125 mg/dl; or
 - Two-hour plasma glucose (after a 75 gm glucose load): 140-199 mg/dl
- Been diagnosed with gestational diabetes during a previous pregnancy

Goals of the CDC-Recognized Lifestyle Change Program

The goals of the CDC-recognized lifestyle change program include:³⁵

- 5-7% weight loss in the first six months
- Moderate changes toward healthier eating
- Increased physical activity (150 minutes/week)
- Self-monitoring of food intake and physical activity
- Weekly weigh-ins and collection of food and activity logs to track progress with outcome goals
- Emphasis on increasing self-efficacy and problem-solving
- Coach feedback and interactive group discussion

4. **Health Marketing:** Increase referrals to and participation in CDC-recognized lifestyle change programs nationwide utilizing marketing to increase referrals to and participation in lifestyle change programs.

Awareness Campaigns

In coordination with the CDC's NDPP two awareness campaigns have been developed and promoted. These are described briefly below.

Prevent Diabetes STAT (Screen, Test, Act - Today™)

In 2015 the American Medical Association (AMA) and CDC initiated the multi-year *Prevent Diabetes STAT* awareness campaign with the main target audience being physicians. The campaign includes several key resources including a toolkit designed to serve as a guide on the best methods to screen and refer people at high-risk for type 2 diabetes to qualified lifestyle change programs in their communities. In addition, there is an online screening tool for at-risk individuals. The campaign website is: <http://www.preventdiabetesstat.org>

The partnership goals are to engage physicians to:

1. Encourage people at high risk of or with prediabetes to be screened for prediabetes and for those identified with prediabetes to participate in a CDC-recognized lifestyle change program (LCP)
2. Screen and refer people with prediabetes to LCPs
3. Encourage employers/insurers to provide health insurance coverage for LCPs

Do I Have Prediabetes Public Awareness Campaign

In 2016 the American Medical Association (AMA), American Diabetes Association (ADA), CDC and the Ad Council initiated a public awareness campaign to raise awareness among people at risk for or with prediabetes. The key resources are a national public service advertising (PSA) campaign focused on prediabetes with the tagline *No one is excused from prediabetes*. The campaign website is: <http://doihaveprediabetes.org>.

Humorous PSAs in English and Spanish encourage people to take a short online risk test on the website. People can also take the risk test in real-time through interactive TV and radio PSAs, and learn more about the risk factors associated with prediabetes. The campaign website features lifestyle tips and links to the CDC's website and their registry of CDC-recognized lifestyle change programs. The campaign also includes an integrated SMS texting initiative that allows people to take the risk test via text message and receive ongoing support and lifestyle tips.

The goal of the partnership is to encourage people to take a short online survey to assess their risk for prediabetes, to confirm their results with a healthcare provider, and to seek out and participate in a CDC-recognized lifestyle change program.

Medicare (CMS) Adds Diabetes Prevention Program (MDPP) as Preventive Service in 2018

In March 2016, the Department of Health and Human Services (HHS) announced the initial action towards coverage for a diabetes prevention program administered by Centers for Medicare and Medicaid Services (CMS) for Medicare beneficiaries who qualify for the service.³⁸ The addition of this preventive care benefit for Medicare beneficiaries would be the first Medicare preventive service of its kind. This potential program coverage is being allowed under stipulations in the 2010 Affordable Care Act (ACA). ACA allows for a preventive care benefit to be added as a Medicare service if the independent Office of the Actuary in CMS certifies that the expansion would improve the quality of care and save healthcare dollars. The evidence for the addition of the Medicare DPP (MDPP) was drawn from a study that was awarded to the Y-USA (National YMCA) in 2011 and funded by ACA to determine if the NDPP model (described elsewhere in this report) proved medically beneficial for Medicare beneficiaries and had the potential to produce cost savings for Medicare. After 15 months of the study the results demonstrated success. The enrolled Medicare beneficiaries lost about 5% of their body weight. Over 80% of participants attended at least 4 weekly sessions. The independent Office of the Actuary in CMS certified that there was an estimated cost savings of \$2650 per participant for Medicare after 15 months.³⁹ This allowed the benefit to be added as a preventive service for eligible beneficiaries.

In July 2016 CMS published the Revisions to Payment Policies under the Physician Fee Schedule (PFS) and Other Revisions to Part B for CY 2017.⁴⁰ Proposed final regulations for expansion of the MDPP were included. A 60-day public comment period on these proposed final regulations closed early in September 2016. The Medicare Diabetes Prevention Program (MDPP) final rule finalizes aspects of the expansion that will enable organizations, including those new to Medicare, to prepare for enrollment into Medicare as MDPP suppliers. Finalized policies in these final regulations include the definition of the MDPP benefit, beneficiary eligibility criteria, and supplier eligibility and enrollment criteria. Future rulemaking will address policies related to payment, virtual providers, and other program integrity safeguards.^{41,42} To sign up for updates about this program, please subscribe to the Medicare Diabetes Prevention Program listserv (<https://public.govdelivery.com/accounts/USCMS/subscriber/qualify>.)

Section V. Summary of Formative Research and the Virginia State Engagement Meeting

In January 2016 the Virginia Center for Diabetes Prevention and Education (VCDPE) contracted with the Virginia Department of Health (VDH) Chronic Disease Unit to develop a strategic plan for the prevention of type 2 diabetes for Virginia. The VCDPE is located at the University of Virginia in the School of Medicine and has the mission to improve quality and accessibility of care for persons at risk for and with diabetes. Learn more about VCDPE by accessing our website at <https://med.virginia.edu/vcdpe/>

The project team to develop this report and the strategic plan for the prevention of type 2 diabetes in Virginia included the Director of the VCDPE, Joyce Green Pastors, MS, RD, CDE, Alexa Painter, MPH, Education and Outreach Coordinator with the VCDPE, and two consultants hired by VCDPE with expertise in diabetes and obesity management – Hope Warshaw, MMSc, RD, CDE and Anne Wolf, MS, RD.

The Formative Research Process and Interviews

The VCDPE Project Team was tasked with interviewing key stakeholders in Virginia to conduct formative research to determine what diabetes prevention program efforts and initiatives were in place and to determine how best to engage and enroll the priority population. From March-June of 2016 formative research was conducted with key stakeholders who were involved in diabetes prevention in various capacities throughout Virginia. The project team also interviewed individuals employed by entities located around the country that have successfully implemented diabetes prevention programs to gather insights and learnings. Descriptions of these stakeholders and the content of these interviews are detailed below. In total, 47 formative interviews were conducted. Table 3 includes the programs and agencies interviewed.

Table 3. Stakeholder Organizations Interviewed for Formative Research

Stakeholder Group	Organizations Interviewed
National Groups	Commercial (Omada Health, Jenny Craig, Weight Watcher's), National (AADE (American Association of Diabetes Educators); State Health Departments (Colorado & Kentucky); State Advisory Councils (Montana, North Carolina, & Florida)
1422-funded health districts	Crater, Lord Fairfax, Portsmouth, Prince William, West Piedmont
DPP CDC-pending recognition sites	Bon Secours Health System; Center for Healthy Hearts; Omnicity, Prince William Health district; YMCA-Virginia State Alliance
DPP VDH increased capacity funding	Augusta Health; UVA Health System; People's Diabetes Clinic and Pharmacy; Sentara Rockingham Memorial Hospital
Persons with prediabetes	Omada Health; Lose Well with Albemarle County; YMCA of Virginia
Health Care Systems	Sentara Healthcare; Novant Health; INOVA Health System
Health Care Organizations	Area Agency Aging/Dept. of Rehabilitative Services; Virginia Health Quality Center (now Health Quality Innovators); Medical Society of Virginia
Payers	Anthem Blue Cross and Blue Shield; Optima; Coventry Cares of Virginia/ Aetna
Purchasers/ Large Employers	Fairfax County and City Public Schools; City of Virginia Beach and Public Schools; University of Virginia Health System; Bon Secours Health System; Huntington Ingalls; KVAT Food Stores

Description of Virginia-based Stakeholders Interviewed

The team interviewed various Virginia-based stakeholders to determine what, if any, diabetes prevention program efforts and initiatives were in place including agencies/organizations that had recently received grant funding to implement CDC-recognized lifestyle change programs. One group the team interviewed was five health districts located in high risk for diabetes areas of the state that received 1422 grant funding from the CDC and VDH (see page 31 for description of this funding). The others are three health systems and one pharmacy/diabetes clinic that received funding from VDH in January 2016 to enhance capacity of diabetes prevention programs.

The team also interviewed several of the largest employers in the Commonwealth to determine what, if any, screenings, referral systems or programs they were offering to people at high risk for type 2 diabetes or with prediabetes. The team also sought information about coverage for these services. Three large health care systems, three health care organizations, and three large insurers were included.

Lastly, we obtained comments from participants who had been in a variety of diabetes prevention programs: an employer-based program facilitated by a RD/RDN, an online program, and a community-based program with a trained lifestyle coach.

Description of National Stakeholders Interviewed

The project team interviewed 10 national stakeholders with expertise and experience in delivering the CDC NDPP.

- YMCA of the USA (Y-USA) - this model of diabetes prevention is offered in a community-based setting that emphasizes health and wellness
- American Association of Diabetes Educators (AADE) – this model implements the CDC-recognized lifestyle change program in recognized or accredited DSMES programs
- States that had received initial funding from CDC to develop diabetes prevention programs in departments of health – Colorado, Kentucky, Montana, and North Carolina
- For-profit entities that have pending recognition to deliver the CDC-recognized lifestyle change program – Omada Health, a digitally delivered program with human coaching and two commercial weight loss programs, Weight Watcher’s and Jenny Craig

All interviews were conducted by conference call with at least two project team members. The following content areas were covered:

- Background and logistics of diabetes prevention program (if being planned or already implemented)
- Staff and training champions/leaders
- Partnerships
- Marketing
- Funding, coverage and reimbursement
- Challenges
- Successes
- Future goals/sustainability

Key Observations from Formative Research and Interviews

Virginia-based Stakeholders

1422 grant-funded Health Districts

- Agencies that received VDH grant funding reported significant variation in how they chose to implement the NDPP, specifically how they used their funding, timelines for program implementation, persons trained for lifestyle coaching, and initiation of partnerships.
- Community partnerships were created in several of the five health districts which include the YMCA, Area Agencies on Aging (AAA), Federally Qualified Health Centers (FQHC's), and Cooperative Extension Agencies.
- There was an expressed need for additional statewide leadership to provide expertise, communication, and coordination for diabetes prevention efforts.

CDC-Recognition Lifestyle Change Program Sites

Five of the eight CDC-pending recognition for lifestyle change program sites agreed to be interviewed. Two YMCA districts in Virginia have received CDC-pending recognition but there are several other Y's in Virginia that are in various stages of implementing the CDC-recognition lifestyle change program. Within our research we learned that the Y-USA has their own system to develop and achieve readiness to apply for CDC-pending recognition for lifestyle change program. Our observation is that this is a good strategy for potentially improving program sustainability. Another advantage we see with the Y's in Virginia is that they have developed a YMCA Virginia State Alliance whose membership includes program directors of Y's throughout the state.

- The YMCA-Virginia state alliance has been very successful in providing coordination, communication, and promoting spread of diabetes prevention programs in Virginia

Another CDC-pending recognition lifestyle change program site interviewed was the Bon Secours Health System, the first health system in Virginia to implement the NDPP for their employees. This program, provided through their employee wellness program, is offered as an employee health benefit. Our research demonstrates that inclusion of diabetes prevention as an employee health benefit and covered through a self-insured health plan may be the most successful model for program sustainability.

- Bon Secours is the first health system in Virginia to provide reimbursement for diabetes prevention for employees in their self-insured health plan – this may be a good model for other health systems throughout Virginia

The CDC-pending recognition sites interviewed that appeared to be the most challenged with scaling and sustainability were a free clinic and a health district.

- Free Clinics are a good community model for implementation of NDPP but may need to partner with other agencies/organizations for reimbursement and sustainability
- The components observed for successful diabetes prevention programming in health districts are having a champion, leadership, and utilizing creative partnerships.

Since January 2016, the number of CDC-pending recognition lifestyle change program sites in Virginia has doubled from eight to sixteen, indicating an increased interest and awareness of the NDPP. The project team believes that work to raise awareness and knowledge of the NDPP and the DPRP process has been a factor.

These sites include:

- 5 free clinics
- 3 health systems
- 2 YMCA's
- 2 Health Districts
- 1 FQHC
- 1 employer-based
- 1 Virginia Cooperative Extension
- 1 Native American non-profit

Health Systems

- Most health systems are delivering diabetes prevention in the form of one or two classes or within their DSME program. They are not delivering the CDC-based DPP.
- Many diabetes educators within DSME programs have limited knowledge of the elements of the CDC-based DPP program, including DPRP process and the curriculum. They are also unaware of AADE's DPP efforts with CDC and the importance of lifestyle coach training and the skills acquired to effectively facilitate the CDC lifestyle change program for diabetes prevention.
- A stated lack of support from senior leadership for DSME programs to develop and deliver DPP.
- Diabetes educators have concerns about participation and enrollment in a year-long DPP program as well as their ability to staff these programs.
- Potential exists for diabetes educators/DSME programs to develop and foster partnerships with community-based programs who are or will deliver DPP programs.

Health Care Organizations

- The healthcare organizations interviewed in this group use the Stanford Chronic Disease Program and have partnered together due to the success of using this model and to increase the spread/ number of available programs in the state
- These organizations cover the major area of the state and offer the programs for free
- There was an expressed need for additional partnerships with other organizations for sustained funding- (e.g., YMCA's or other community-focused groups)
- Concern about partnerships with DSME programs was expressed due to feelings of competition; there is a need for additional communication with both groups to discuss ideas for working together (e.g., mentoring, training, and referrals)

Purchasers: Large Employers

- Most employers interviewed were self-insured with various health insurance programs, including Anthem, Aetna, Optima and Cigna.
- These employers offer screenings for both prediabetes and diabetes-this helps in referring their employees to programs that are offered.
- Programs that are offered include online education, online platforms that engage employees with challenges that support greater movement, better dietary intake and weight loss, health coaching, and referrals to programs.
- Most programs offer incentives for employees to complete wellness programs, such as monetary incentives, scales, pedometers, discounts to gyms or wellness centers, discounts to Weight Watchers, and cookbooks.

Payers: Health Plans

- There is a high interest in diabetes prevention, but programs offered are primarily for people with type 2 diabetes.
- The programs for people with diabetes include health coaching, online education and incentives to help patients be more compliant with their medications. Self-insured employers often chosen additional programs.
- Most health insurance plans would like to view and analyze data and form partnerships before considerations of coverage for diabetes prevention programs.
- The organizations that were interviewed expressed that the most important methods of obtaining health insurance coverage for diabetes prevention include partnerships and providing data on effectiveness of the diabetes prevention program (including weight loss, participation rates.)
- The Affordable Care Act has brought both successes and challenges with coverage for diabetes prevention. The successes were that the ACA is more preventatively focused. But the challenge for health insurance companies is that there are so many competing requirements, like integration of technology, that there is limited time and resources for prevention.

Persons with Prediabetes

- Most people were not referred by a health care provide - they found programs on their own
- Most people with prediabetes were told by their healthcare provider that they were at high risk of diabetes based on hemoglobin A1C results
- Persons with prediabetes were enrolled in variety of programs, including employer-based, online, and the YMCA
- Some people felt that “lifestyle change programs” were more enticing than “diabetes prevention programs” due to stigmas of diabetes and wishing to keep their diagnosis private.
- Some participants struggled with the structure of the diabetes prevention program due to time commitment and difficulty with requirements of program (e.g., attendance, physical activity, tracking, and weight loss requirements).

Virginia State Engagement Meeting on Prevention of Type 2 Diabetes and the NDPP

National Association of Chronic Disease Directors (NACDD)

In early 2016, Virginia was one of nine states chosen by the CDC to work with the National Association of Chronic Disease Directors (NACDD) to conduct a State Engagement Meeting with the goal of providing stakeholders in Virginia with technical assistance to scale and sustain the NDPP. NACDD was one of the national organizations that received funding from CDC in 2012 to assist states to build momentum for a national movement to prevent type 2 diabetes. Learn more about NACDD at: <http://www.chronicdisease.org/>

The UVA/VCDPE project team and the VDH Chronic Disease Unit worked with the NACDD to plan the two day Virginia State Engagement Meeting which occurred on September 28-29, 2016 in Richmond. The planning team and VDH identified and invited key national and Virginia-based stakeholders in diabetes prevention.

Planning of the State Engagement Meeting

NACDD has, in coordination with CDC, has developed a detailed process for engaging health department staff and key stakeholders in a two-day meeting.

The goals of the meeting are to:

- Improve understanding of the research base
- Increase knowledge of the landscape for the implementation of the NDPP
- Engage stakeholders in an interactive discussion about how to move diabetes prevention efforts forward in the state

The CDC has developed four priority areas to scale and sustain the NDPP. These are:

- Increasing awareness of prediabetes
- Increased clinical screening, testing, and referral to CDC's recognized lifestyle change program (LCP)
- Reimbursement/coverage of the LCP
- Availability of and support for existing and/or new LCP

Based on advice from NACDD and findings from the VCDPE project team's formative research, some stakeholders were invited to attend both Day 1 and 2 while others were invited to attend just Day 1. Appendix 1 includes the Day 1 and Day 2 agendas.

Evaluation of Virginia Diabetes Prevention State Engagement Meeting

A total of 99 stakeholders attended the Day 1 educational program and 59 stakeholders attended the action planning session on Day 2. Community-based organizations and Health Systems had the greatest representation.

Table 4. Stakeholder Attendance for the Virginia Diabetes Prevention State Engagement Meeting

Category	Response Percent (count)	Response Percent (count)
	Day 1	Day 2
Business	6.7% (4)	3.2% (1)
Health System	45.0% (27)	41.9% (13)
National DPP	8.3% (5)	3.2% (1)
Government	18.3% (11)	19.4% (6)
Community-Based Organization	51.7% (31)	58.1% (18)
Education/Academia	21.7% (13)	9.7% (3)
Philanthropy	5.0% (3)	3.2% (1)
*Other	(18)	(6)

Other: Grocery/Food, Health Plan, Non-Profit Health Center, Wellness Center, Private Healthcare/ Diabetes Wellness Center, Health center controlled network, Pharmacy, Senior Agency, Academia, Non-profit clinic, Medicaid MCO, Managed Care Organization, Insurance, IT & QI Support – FQHCs, YMCA, Providers/CMS/QI, Policy/Physician Association
***Some respondents chose more than one category and wrote in the Other option.**

Of the four priority areas discussed, the majority of stakeholders were interested in getting involved in two areas: increase awareness of prediabetes and increased clinical screening and testing for prediabetes and referral to the LCP. Table 5 summarizes this information.

Table 5. Stakeholder Interest Area from Virginia Diabetes Prevention State Engagement Meeting

Interest Areas	Response Count/Percent
Increasing Awareness About the National DPP and Prediabetes	43 (66.2%)
Establishing and/or Expanding a CDC-Recognized DPP	38 (58.5%)
Developing Systems to Support Health Care Provider Referrals	25 (38.5%)
Screening and Testing for Prediabetes	23 (35.4%)
Insurance Reimbursement & Employer Coverage	20 (30.8%)
Other	5 (7.7%)

'Other Interest Areas'
Not sure yet - VHHA has strong partner relationships with all hospital and health systems in VA Worksite Wellness with DPP & chronic disease mgmt.
Tech. assistance to sustain DPP in PWHHD Partnerships with pharmacy for prevention & education on clinical programs.
Containing/sustaining existing DPP I currently work as a volunteer DPP coach w/ Hampton Roads YMCA
Partnering in treatment & education to prevention Am already conducting DPP program
Working to make Sentara Medical Group Providers aware of DPP & referring patients to a DPP

When participants were asked what they were most interested in accomplishing with statewide collaborative efforts to prevent type 2 diabetes, the following themes emerged:

- Expansion of the NDPP
- Increasing awareness of prediabetes and the importance of prevention of type 2 diabetes
- Leveraging partnerships

When stakeholders attending Day 2 were asked if they were interested in taking on a leadership role with this collaborative effort, 34% indicated an interest.

When respondents interested in taking on a leadership role were asked what challenges they anticipate with implementation of the NDPP Action Plan, they indicated:

- Time
- Financial resources
- Adequate referrals
- Leveraging partnerships

Table 6. Stakeholder Opinions on Challenges to Anticipate with Implementation of the NDPP Action Plan

Time and Money	
Getting started. Meeting - since we are all over the state & everyone's schedule is already full. Resources/funding.	Time, Competition is still in the air
Assessing financial support of the program. Acquiring training for lifestyle coaches.	Providing funding for lifestyle coaches
Keeping momentum	Holiday slump/competing priorities
My employer buy in to allow me time to work on action plan	Over-committed stakeholders
Reimbursement	Funding that is long term
Referrals	
Referral Process, Educating Healthcare Providers, Involving partners/funding purposes	Obtaining participants, getting buy in from physicians.
Buy in from Health Systems and FQHC on referrals for the program. Awareness in unique ways and continuing with passion.	Getting Provider buy in - referrals of patients. increasing screening for prediabetes
Encouraging MDs to recognize need to incorporate preventative measures to reduce type 2 diabetes. Too many don't recognize prediabetes or don't encourage patients to seek out lifestyle changes. Need physician education.	Communicating with our higher up's to implement DPP; getting physician involved and spread awareness.
Engaging providers & getting their buy-in.	
Leveraging Partnerships	
Identifying the need within our area. What is our support system.	Finding or identifying partnerships, reimbursement
Appropriate staff needed to effectively implement the program.	Getting to key CMO's/CFO's
ID the appropriate stakeholder for buy-in & support.	It's great having collaborative efforts but sometimes having many partners at the table can bog things down. It can also slow momentum if everyone doesn't stay engaged.
Follow through action	Keeping everyone involved to help to move the plan forward.
More detail needed on responsible parties and who is leading/driving this work.	Establishing partnerships

Section VI. Strategic Plan

The formative research based on interviews conducted by the VCDPE project team, in conjunction with the report by NACDD from the Virginia State Engagement Meeting, were utilized to inform the development of the Strategic Plan for Diabetes Prevention found in this section. This strategic plan will be used to move Virginia forward to scale and sustain the NDPP and work collaboratively with Virginia stakeholders to prevent type 2 diabetes during 2017-2018.

Strategic Plan for Diabetes Prevention

Priority Area 1: Awareness of Prediabetes
Goal: Increase the number of Virginians who know they have prediabetes
Objective 1: Establish an awareness of prediabetes workgroup within the Virginia Diabetes Council (VDC)
Strategies:
1. Identify and engage stakeholders in Virginia to become for a member of the VDC workgroup to improve coordination & communication
2. Foster partnerships within the VDC workgroup to share program ideas and successes
Objective 2: Develop a statewide public awareness campaign to raise awareness among people at high risk for type 2 diabetes and those with prediabetes
Strategies:
1. Identify target audiences for the prediabetes awareness campaign
2. Identify existing ad campaigns and resources that can be utilized or modified for the identified target audiences
3. Develop additional resources to provide rationale for using and implementing CDC-recognized lifestyle change program (LCP)
4. Identify funding for and leverage existing community resources to support the prediabetes awareness campaign
5. Test campaign (pilot) with target audiences
6. Evaluate pilot testing and implement necessary changes
7. Launch prediabetes awareness campaign
8. Use liaison with diabetes educators and other diabetes prevention champions to promote messaging about CDC-recognized Lifestyle Change Program

Priority Area 1: Awareness of Prediabetes

Objective 3: Increase awareness of prediabetes and the CDC-recognized Lifestyle Change Program among health care providers.

Strategies:

1. Partner with healthcare provider organizations (such as Medical Society of Virginia, Virginia Council of Nurse Practitioners, Virginia Academy of Family Practice Physicians, etc.) to develop a communication plan educate them on the topics of:
 - a. Prediabetes
 - b. CDC-recognized Lifestyle Change Program
 - c. The Virginia Public Awareness Campaign
 - d. Medicare Diabetes Prevention Program (Medicare DPP)
2. Utilize diabetes educators and other diabetes prevention champions in Virginia as liaisons to promote awareness of:
 - a. Prediabetes
 - b. CDC-recognized Lifestyle Change Program
 - c. The Virginia Public Awareness Campaign
 - d. Medicare DPP

Priority 2: Clinical Screening, Testing, and Referral

Goal: Increase the number of Virginians screened, tested, and referred to CDC-recognized Lifestyle Change Program.

Objective 1: Establish a screening, testing, and referral workgroup with the VDC.

Strategies:

1. Identify and engage stakeholders in Virginia to become a member of the VDC workgroup to improve coordination & communication
2. Foster partnerships within the VDC workgroup to share program ideas and successes

Objective 2: Obtain representative baseline data on screening and testing for prediabetes in Virginia

Strategies:

1. Develop templates for use by health care delivery entities to perform retrospective queries of patient records to identify and reach out to their patients at high risk for type 2 diabetes or with prediabetes

Objective 3: Facilitate processes for screening, testing, and referrals with representative groups in Virginia

Strategies:

1. Identify 1-3 representative groups willing to pilot a screening, testing and referral plan within their facility/system
2. Incorporate screening and referral for people at risk for type 2 diabetes or prediabetes into electronic health record (EHR) workflows for providers
3. Incorporate auto-prompts in all EHRs state-wide to facilitate referrals to a CDC-recognized Lifestyle Change Program
4. Create decision-making flags in EHRs to alert providers for people at risk for type 2 diabetes or with prediabetes (flags would prompt health care provider to review or order fasting glucose, OGTT, or A1C tests)
5. Create automatic referral system for people who meet risk factors for prediabetes or type 2 diabetes in any primary care setting

Priority 2: Clinical Screening, Testing, and Referral

Strategies:

1. Explore the Prevent Diabetes STAT toolkit (from AMA/CDC) for use and, as needed, develop a toolkit and resources to support providers and systems to screen, test, and refer to a CDC-recognized Lifestyle Change Program
2. Develop a dissemination plan for distributing the toolkit and resources

Strategies:

1. Identify 1-3 representative groups willing to pilot a screening, testing and referral plan within their facility/system
2. Incorporate screening and referral for people at risk for type 2 diabetes or prediabetes into electronic health record (EHR) workflows for providers
3. Incorporate auto-prompts in all EHRs state-wide to facilitate referrals to a CDC-recognized Lifestyle Change Program

Priority Area 3: Coverage of CDC-recognized Lifestyle Change Program

Goal: Increase coverage of CDC-recognized Lifestyle Change Program by employers and insurance plans across Virginia

Objective 1: Use the diabetes prevention workgroup within VDC to address coverage of the CDC-recognized Lifestyle Change Program.

Strategies:

1. Identify and engage stakeholders in Virginia to become a member of the VDC workgroup
2. Foster partnerships within workgroup

Objective 2: Increase number of Virginia-based self-insured (large) employers who will provide coverage for a CDC-recognized Lifestyle Change Program

Strategies:

1. Explore existing business case resources or develop additional resources to demonstrate the business case for the CDC-recognized Lifestyle Change Program for large employers to cover as an employee health benefit
2. Work with Virginia Medical Society and Virginia Business Coalition on Health to review and provide input to the business case resource for large employers
3. Develop a dissemination plan to distribute the business case resource for large employers

Objective 3: Increase number of health plans in Virginia that cover the CDC-recognized Lifestyle Change Program

Strategies:

1. Develop the business case resource for CDC-recognized Lifestyle Change Programs for large health plans in Virginia
2. Identify a champion within key health plans across the state to review and provide input to the business case resource
3. Develop a dissemination plan to distribute the business case resource to health plans
4. Identify quality healthcare measures that CDC-recognized Lifestyle Change Program has potential to impact (such as HEDIS)

Priority Area 3: Coverage of CDC-recognized Lifestyle Change Program

Objective 4: Disseminate information on the new Medicare DPP benefit to health care providers and Medicare beneficiaries in Virginia

Strategies:

1. Identify consumer and health care provider resources developed by CMS for Medicare DPP
2. Determine if a simple resource for providers and Medicare beneficiaries needs to be developed
3. Disseminate information and resources about the Medicare DPP to providers, consumers, and other relevant stakeholders

Objective 5: Engage the Virginia Department of Human Resources Management (DHRM) to provide CDC-recognized Lifestyle Change Programs as a covered benefit for state employees

Strategies:

1. Link DHRM with other state employee organizations that provide CDC-recognized Lifestyle Change Programs as covered employee benefit
2. Provide the business case resource for DHRM to offer CDC-recognized Lifestyle Change Programs to state employees

Objective 6: Disseminate information about new coverage of CDC-recognized Lifestyle Change Programs by employers and health plans to diabetes prevention stakeholders to keep them updated

Strategies:

1. Use existing websites and communication vehicles to update stakeholders about coverage

Objective 7: Investigate funding models for agencies to provide the CDC-recognized Lifestyle Change Programs for uninsured and under-insured persons at risk for type 2 diabetes or with prediabetes (e.g. free clinics)

Strategies:

1. Conduct assessment of free clinics that are currently providing CDC-recognized Lifestyle Change Programs and identify sources and gaps in funding

Priority Area 4: Availability and Support

Goal: Increase availability and support of CDC-recognized Lifestyle Change Programs

Objective 1: Establish a diabetes prevention workgroup within VDC to increase availability and support for CDC-recognized Lifestyle Change Programs.

Strategies:

1. Identify and engage members of the diabetes prevention workgroup within the VDC to:
 - a. Establish leadership
 - b. Develop regional networks
 - c. Seek funding
 - d. Develop a tracking and reporting structure for CDC-recognized Lifestyle Change Programs with pending and full recognition by CDC
 - e. Involve public and private insurance companies
 - f. Monitor and disseminate data on the clinical and cost effectiveness of CDC-recognized Lifestyle Change Programs
 - g. Foster partnerships

Priority Area 4: Availability and Support

Objective 2: Increase the number of CDC-recognized Lifestyle Change Programs in regions of the Commonwealth that serve high risk populations

Strategies:

1. Identify and maintain a current and available listing of existing CDC-recognized Lifestyle Change Programs and make this available on the VDC, Virginia Department of Health (VDH) and Virginia Center for Diabetes Prevention and Education (VCDPE) websites
2. Identify where gaps in available programs exist in high risk regions
3. Identify champions, organizations, and partnerships to increase availability of CDC-recognized Lifestyle Change Programs in high risk regions

Objective 3: Establish a technical assistance center to train and scale and sustain CDC-recognized Lifestyle Change Programs

Strategies:

1. Offer lifestyle coach training to potential facilitators/providers of CDC-recognized Lifestyle Change Programs
2. Provide technical assistance to interested entities to scale diabetes prevention programs;
3. provide technical assistance to existing CDC-recognized Lifestyle Change Programs about the Diabetes Prevention Recognition Program (DPRP) process to promote sustainability
4. Develop regional networks to share best practices
5. Expand web portals with Virginia-specific resources for diabetes prevention
6. Develop a structure for additional training for facilitators using the Stanford Chronic Disease Program model to deliver diabetes prevention
7. Develop a structure for continuing education for facilitators using the CDC-recognized Lifestyle Change Program

Objective 4: Foster working relationships with organizations using the Stanford Chronic Disease program model in order to increase referrals to the CDC-recognized Lifestyle Change Programs

Strategies:

1. Involve lead organizations that use the Stanford Chronic Disease program model in the VDC diabetes prevention workgroup, (i.e. Health Quality Indicator Orgs.)

Section VII. Implementation

The Virginia Diabetes Council (VDC) is a 501c3 non-profit organization that serves as the advisory group for the work being done by VDH in diabetes prevention and control in Virginia. This group previously developed a plan called the Virginia Diabetes Plan (2008-2017). To access this plan as well as learn more about the Virginia Diabetes Council, visit the website at <http://www.virginiadiabetes.org>.

The VDC will serve as the coordinating entity for the implementation of the Strategic Plan for Diabetes Prevention. A diabetes prevention workgroup of interested stakeholders across Virginia will be formed to provide oversight and direction.

References

- ¹Centers for Disease Control and Prevention. National Diabetes Statistics Report: Estimates of Diabetes and Its Burden in the United States, 2014. Atlanta, GA: US Department of Health and Human Services; 2014.
- ²Pan XR, Li GW, Hu YH, et al. Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance. The Da Qing IGT and Diabetes Study. *Diabetes Care* 1997;20: 537–544.
- ³Knowler WC, Barrett-Conner E, Fowler SE, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002;346:393-403.
- ⁴Tuomilehto J, Lindstrom J, Eriksson J, et al. Finnish Diabetes Prevention Program Study Group. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med* 2001;344:1343-1350.
- ⁵American Diabetes Association Standards of Medical Care in Diabetes. Classification and diagnosis of diabetes. *Diabetes Care* 2016; 39 (Suppl. 1): S13-S22.
- ⁶Gong Q, Zhang P, Wang, J, et al. Changes in Mortality in People with IGT Before and After the Onset of Diabetes During the 23-year Follow up of the Da Qing Diabetes Prevention Study. *Diabetes Care* 2016;39(9):1550-1555.
- ⁷Dall TM, Yang, W, Halder, P, et al. The Economic Burden of Elevated Blood Glucose Levels in 2012: Diagnosed and Undiagnosed Diabetes, Gestational Diabetes Mellitus, and Prediabetes. *Diabetes Care* 2014;37:3172-79.
- ⁸Menke A, Casagrande S, Geiss L, Cowie C. Prevalence and Trends in Diabetes Among Adults in the United States, 1998-2012. *JAMA* 2015;314(10):1021-1029.
- ⁹CDC. <http://www.cdc.gov/diabetes/data/index.html>. Accessed September 2016.
- ¹⁰Virginia Department of Health Behavioral Risk Factor Surveillance System: 2013. Compiled and extrapolated from national data by the Office of Family Health Services, Division of Policy and Evaluation.
- ¹¹Li 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.
- ¹²Li G, Zhang P, Wang J, et al. Cardiovascular mortality, all-cause mortality, and diabetes incidence after lifestyle intervention for people with impaired glucose tolerance in the Da Qing Diabetes Prevention Study: a 23-year follow-up study. *Lancet Diabetes Endocrinol* 2014; 2:474–480.
- ¹³Gong Q, Gregg EW, Wang J, et al. Long-term effects of a randomized trial of a 6-year lifestyle intervention in impaired glucose tolerance on diabetes-related microvascular complications: the China Da Qing Diabetes Prevention Outcome Study. *Diabetologia* 2011;54:300–307.
- ¹⁴Lindstrom J, Peltonen M, Eriksson JG, et al.; Finnish Diabetes Prevention Study (DPS). Improved lifestyle and decreased diabetes risk over 13 years: long-term follow-up of the randomized Finnish Diabetes Prevention Study (DPS). *Diabetologia* 2013;56:284–293.
- ¹⁵Knowler 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.
- ¹⁶Diabetes Prevention Program Research Group. Long-term effects of lifestyle intervention or metformin on diabetes development and microvascular complications over 15-year follow up: The Diabetes Prevention Program Outcomes Study. *Lancet Diabetes Endocrinol* 2015;3:866-75.
- ¹⁷Herman 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.
- ¹⁸Cefalu WT, Buse JB, Tuomilehto J, et al. Update and Next Steps for Real World Translation of Interventions for Type 2 Diabetes Prevention: Reflections from a Diabetes Care Editors’ Expert Forum. *Diabetes Care* 2016;39:1186-1201.

- ¹⁹US Department of Health and Human Services and US Department of Agriculture. 2015–2020 Dietary Guidelines for Americans. 8th Edition. December 2015. Available at <http://health.gov/dietaryguidelines/2015/guidelines/> Accessed December 2016
- ²⁰Hamman R, Horton E, Barrett-Connor E, et al. Factors affecting the decline in incidence of diabetes in the Diabetes Prevention Program Outcomes Study (DPPOS). *Diabetes*. 2015;64(3):989-998.
- ²¹Maruthur N, Ma Y, Delahanty L, et al. Early response to preventive strategies in the Diabetes Prevention Program. *J Gen Int Med*. 2013;28(12):1629-1636.
- ²²Pronk NP, Remington PL et al. Combined Diet and Physical Activity Promotion Programs for Prevention of Diabetes: Community Preventive Services Task Force Recommendation Statement. *Ann Intern Med*. 2015;163:465-468.
- ²³Institute for Clinical and Economic Review. Final Evidence Report-Diabetes Prevention Programs. July 2016. <https://icer-review.org/material/final-report-dpp/> Accessed December 2016.
- ²⁴Ackermann R, Finch E, Brizendine E, Zhou H, Marrero D. Translating the Diabetes Prevention Program into the community. The DEPLOY Pilot Study. *AJPM*. 2008;35(4):357-363.
- ²⁵Ackermann R, Finch E, Caffrey H, Lipscomb E, Hays L, Saha C. Long-term effects of a community-based lifestyle intervention to prevent type 2 diabetes: the DEPLOY extension pilot study. *Chronic illness*. 2011;7(4):279-290.
- ²⁶Ackermann R, Marrero D. Adapting the Diabetes Prevention Program lifestyle intervention for delivery in the community: the YMCA model. *The Diabetes educator*. 2007;33(1):69, 74- 65, 77-68.
- ²⁷Vojta D, Koehler T, Longjohn M, Lever J, Caputo N. A coordinated national model for diabetes prevention: linking health systems to an evidence-based community program. *AJPM* 2013;44(4 Suppl 4):S301-306.
- ²⁸Marrero DG, Palmer KNB, Phillips EO, Miller-Kovach K, Foster GD, Saha CK. Comparison of Commercial and Self-Initiated Weight Loss Programs in People With Prediabetes: A Randomized Control Trial. *AJPH* 2016;106(5):949-956.
- ²⁹Montana Department of Public Health & Human Services. Adult Medicaid Beneficiaries Successfully Participating in an Adapted Diabetes Prevention Program. Vol 92014.
- ³⁰Katula, JA. Vitolins, MZ, Rosenberger EL, et al. One-Year Results of a Community-Based Translation of the Diabetes Prevention Program. *Diabetes Care* 2011, vol. 34, no. 7 pp. 1451-1457.
- ³¹DiBenedetto JC, Blum NM, O’Brian CA, Kolb LE, Lipman RD. Achievement of Weight Loss and Other Requirements of Diabetes Prevention and Recognition Program: A National Diabetes Prevention Program Network Based on Nationally Certified Diabetes Self-Management Education Programs. *The Diabetes Educator Online* September 12, 2016 doi:10.1177/0145721716668415
- ³²McTigue K, Conroy M, Hess R, et al. Using the internet to translate an evidence-based lifestyle intervention into practice. *Telemedicine Journal and E-Health* 2009;15(9):851-858.
- ³³Sepah S, Jiang L, Peters A. Translating the Diabetes Prevention Program into an Online Social Network: Validation against CDC Standards. *The Diabetes Educator* 2014;40(4):435-443.
- ³³Sternfeld B, Block C, Quesenberry CP et al. Improving Diet and Physical Activity with ALIVE. A Worksite Randomized Trial. *AJPM* 2009; 36(6):475-483.
- ³⁵CDC NDPP. <http://www.cdc.gov/diabetes/prevention/index.html>. Accessed December 2016.
- ³⁶American Association of Diabetes Educators Webinar – Government Support for Improving DSME Access: Where Do You Fit, and How Can You Help? November 14, 2014. From presentation on State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk

Factors, and Promote School Health (1305) by Pat Schumacher, MS, RD, CDC Division of Diabetes Translation.

³⁷CDC DPRP. <http://www.cdc.gov/diabetes/prevention/lifestyle-program/index.html>. Accessed December 2016.

³⁸Department of Health and Human Services (press release) Independent experts confirm that diabetes prevention model supported by the Affordable Care Act saves money and improves health. <http://www.hhs.gov/about/news/2016/03/23/independent-experts-confirm-diabetes-prevention-model-supported-affordable-care-act-saves-money.html>. Accessed December 2016.

³⁹Certification of the Medicare Diabetes Prevention Program by independent Office of the Actuary in CMS <https://www.cms.gov/Research-Statistics-Data-and-Systems/Research/ActuarialStudies/Downloads/Diabetes-Prevention-Certification-2016-03-14.pdf> Accessed December 2016.

⁴⁰Centers for Medicare and Medicaid Services. Revisions to Payment Policies under the Physician Fee Schedule and Other Revisions to Part B for CY 2017. (Proposed final regulations.) <https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeeSched/PFS-Federal-Regulation-Notices-Items/CMS-1654-P.html>. Accessed December 2016.

⁴¹Centers for Medicare and Medicaid Services. CY 2017 Physician Fee Schedule Final Rule <https://www.cms.gov/medicare/medicare-fee-for-service-payment/physicianfeesched/>. Accessed December 2016. (pp 1019-1108)

⁴²Centers for Medicare and Medicaid Services. Medicare Diabetes Prevention Program (MDPP) Expanded Model. <https://innovation.cms.gov/initiatives/medicare-diabetes-prevention-program/> Accessed December 2016.

Glossary

A1C: also known as hemoglobin A1C, measures an average blood glucose level over a 3-month period. The range of A1C for prediabetes is 5.7-6.4%, and the level for diabetes is over 6.5%.

Abnormal lipid levels: includes high-density lipoprotein (HDL), low-density lipoprotein (LDL), and triglyceride levels. Healthy lipid levels are a total cholesterol level less than 200, HDL cholesterol of 40 or higher, LDL cholesterol of less than 100, and triglyceride level less than 150.

CDC-recognized lifestyle change program (LCP): diabetes prevention program under the Center for Disease Control and Prevention's National Diabetes Prevention Program (NDPP).

Certified Diabetes Educator (CDE): a health professional who possesses comprehensive knowledge of and experience in prediabetes, diabetes prevention, and management. The CDE educates and supports people affected by diabetes to understand and manage the condition.

Chronic inflammation: inflammation that may have a rapid or slow onset but is characterized primarily by its persistence and lack of clear resolution; it occurs when the tissues are unable to overcome the effects of the injuring agent.

Federally-qualified health center (FQHC): a reimbursement designation from the Bureau of Primary Health Care and the Centers for Medicare and Medicaid Services; provides primary and preventive care, including oral and mental health to all ages regardless of method of payment. Health programs that are funded include community health centers, migrant health centers, health care for homeless programs, and public housing primary care programs.

Gestational diabetes: also known as gestational diabetes mellitus (GDM), is when a woman without diabetes, develops high blood glucose levels during pregnancy.

Hypertension: abnormally high blood pressure, often occurs when the arteries or veins become blocked or narrowed, making the heart work harder to pump blood. A normal blood pressure reading should be more than 120 over 80 and less than 140 over 90.

Insulin resistance: a pathological condition in which cells fail to respond normally to the hormone insulin. In contrast, when the body produces insulin under conditions of insulin resistance, the cells are resistant to the insulin and are unable to use it as effectively, leading to high blood glucose.

Lifestyle modification: involves altering long-term habits, typically of eating or physical activity, and maintaining the new behavior for months or years.

Retinopathy: a complication of diabetes also known as diabetic retinopathy, disease of the retina that is caused by damage to the blood vessels of the retina. Retinopathy is a leading cause of blindness.

State Employee Benefit Plans: a health plan that is established or maintained by an employer or employee organization that provides medical care for participants or their dependents through insurance, reimbursement, or otherwise.

APPENDICES

Appendix 1. Research on Prevention or Delay of Type 2 Diabetes

Proven Approaches to Prevent or Delay Type 2 Diabetes

A variety of methods, including intensive lifestyle modification and/or glucose-lowering medication, have effectively delayed the onset and progression of type 2 diabetes in high-risk individuals among various populations. The following synthesizes several decades of this research.

One of the first large type 2 diabetes prevention studies, the Da Qing study, was initiated in 1986 in Da Qing China.² This study compared one of three active treatment groups, diet only, exercise only, or diet plus exercise to a control group in nearly 600 adults with impaired glucose tolerance (IGT). Follow up was done at two year intervals. After six years of follow up, the incidence of developing type 2 diabetes was reduced by 31-45% with the greatest reduction seen in the diet plus exercise group and the lowest in the exercise-only group.² After 20 years of follow up there was still a 43% lower rate of developing type 2 diabetes as well as a 47% reduction in severe retinopathy.¹¹ After 23 years of follow up, study participants who did not develop type 2 diabetes were more likely to experience significant reductions in cardiovascular (41%) and all-cause mortality (29%).^{12,13} The development of type 2 diabetes after 23 years of follow up was associated with a 73% higher risk of death.¹³

The Finnish Diabetes Prevention Study (DPS), initiated in 1993 and ended early in 2000, evaluated the effects of an intensive lifestyle intervention vs. usual care in over 500 Finnish overweight adults with IGT.⁴ After one and three years, weight reductions were ten and eight pounds, respectively, in the intervention group and approximately two pounds in the control group. Glucose and lipid measures improved more in the intervention group. After four years, the transition from IGT to the diagnosis of type 2 diabetes was reduced by 58% in the intensive lifestyle intervention group⁴. After seven years of follow up, the risk reduction was sustained at 43% and by 13 years, there was a 38% risk reduction.¹⁴

In the US the large multi-site NIH-funded prevention study, the Diabetes Prevention Program (DPP) conducted the intervention segment of the study from 1998 to 2001 in a population of 3000 participants at high risk of developing type 2 diabetes or with prediabetes. The population included about 50% of participants from high risk populations. There were three study groups: intensive lifestyle intervention, metformin plus standard behavioral counseling and education (usual care) and placebo (usual care). After the three initial years of the DPP results showed that the intensive lifestyle intervention reduced the incidence of type 2 diabetes by 58% in the intensive lifestyle intervention group and 31% in the metformin group compared with the placebo group.³ The DPP participants have been followed since 2001 in the observational study called the DPP Outcome Study (DPPOS). The DPPOS reported a 34% and 18% reduced incidence of diabetes among the lifestyle and metformin groups as compared to placebo at 10 years and by 15 years there was a 27% and 17% reduced incidence, respectively.^{15,16} These results demonstrate both the progressive nature of prediabetes and the challenge of maintaining lifestyle change behaviors over ensuing years without significant support.

The results of the DPP and DPPOS were modeled over one's lifetime and it was projected that in the intensive lifestyle intervention group and the metformin group type 2 diabetes was delayed by 11 and three years, respectively and also prevented the onset of type 2 diabetes by 20% and 8% respectively.¹⁷

Overall, the DPPOS did not find lower microvascular or cardiovascular outcomes, likely due to the age of the study population and minimal years of follow up, but did report a 28% lower occurrence of microvascular disease among participants who did not develop diabetes at 15 years.¹⁶ The DPPOS study population continues to be observed.

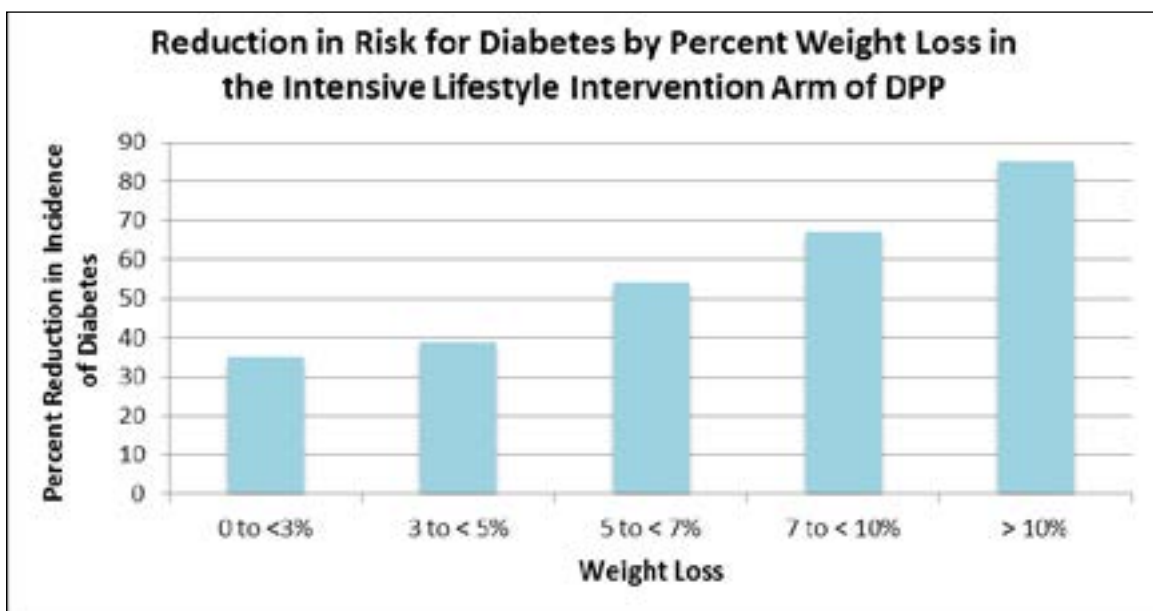
Over the past 25 years, many other research trials in the prevention of type 2 diabetes have been conducted throughout the world, such as Japan, India and Sweden. These studies have been conducted in a variety of populations such as American Indians and Hispanic women with a history of gestational diabetes. Studies have different interventions including various glucose-lowering medications and/or various models of lifestyle intervention.¹⁸ The uniform results from all of these interventions strengthen the evidence demonstrating that programs that aim to detect people at high risk for or with prediabetes are effective in preventing or delaying type 2 diabetes.

The large-scale studies that implemented an intensive lifestyle intervention generally implemented a core set of goals including:

- Weight loss of at least 5-7% and the goal of maintaining maximal weight loss
- Healthy eating pattern (similar to the healthy eating recommendations in the US Dietary Guidelines for Americans)¹⁹
- Engagement in regular physical activity (at least 150 minutes of aerobic activity/week)
- Increased number and frequency of visits

In the DPP/DPPOS the amount of weight loss and the ability to maintain the maximum amount of lost weight was the primary predictor in reducing the incidence of developing type 2 diabetes ranging from a 35% reduction among participants with 0-3% weight loss to an 85% reduction in participants with greater than 10% weight loss (Figure 4). For each two pounds of weight loss participants experienced a 16% reduction in the development of type 2 diabetes. Furthermore, achieving the daily physical activity goal helped individuals maintain achieved weight loss and is known to serve an even more critical role in the maintenance of weight loss.^{20,21}

Figure 7. Reduction in Risk for Type 2 Diabetes by Percent Weight Loss in Intensive Lifestyle Intervention Arm of DPP.



From Maruthur N, et al Journal of general internal medicine. 2013;28(12):1629-1636.

Translation of US Diabetes Prevention Program into Real World Settings Shows Promise

With the positive evidence from the myriad type 2 diabetes prevention studies the next challenge became how to translate these findings into real world settings in which an intensive lifestyle intervention could be delivered in a cost effective manner and continue to achieve the same success. Since the mid 2000's more than 50 studies have tested a variety of settings and means to deliver the program.

A systematic review by the Community Preventive Services Task Force (CPSTF) summarized 53 studies and 66 intensive lifestyle intervention programs published through 2015.²² Their results showed that:

- Healthier eating patterns and regular physical activity reduced type 2 diabetes incidence by 41% compared with usual care
- The average reduction in body weight was 2.2% and fasting plasma glucose by 2.2 mg/dL
- Participants lost more weight and were less likely to develop type 2 diabetes in more intensive programs, those with greater frequency of visits, inclusion of individual sessions, and use of additional personnel
- Participants in the intensive lifestyle intervention groups also experienced reductions in blood pressure and improvements in cholesterol measures that may translate into additional benefits in the long-term prevention of cardiovascular disease^{6,12}

In 2016, the Institute for Clinical and Economic Review (ICER) evaluated the effectiveness and value of a range of type 2 diabetes prevention programs that had obtained pending or full recognition as a CDC-recognition lifestyle change program.²³ ICER reported that in-person group counseling was the most common mode for delivery. Their evaluation agrees with the CPSTF's summary that greater weight loss was observed with personal, more frequent contact.²² ICER also reported that there was greater weight loss in face-to-face versus digital contact. However, if the digital program used a human coaching design, the net benefit was better than with a fully automated program.

ICER evaluated in-person group coaching delivered through the YMCA, Weight Watchers, Montana Department of Public Health, and the HELP PD translational research study. The digital programs evaluated by ICER included programs that contained a human coaching component (Omada Health and Canary Health) and one that was fully automated (Alive-DP). Figure 5 illustrates the amount of weight loss achieved by each of the programs categorized by delivery mode (in-person in group, digital and human coaching combined, or digital/fully automated) as compared to the US DPP trial discussed above. Find a brief description of each of these programs below.

Lifestyle Intervention for Diabetes Prevention at YMCA

Four evaluations of programs delivered at the YMCA are published and indicate that these programs can result in a 2-6% weight loss.²⁴⁻²⁷ The lifestyle program is delivered in groups of 8-12 participants. Groups meet for the 16 core lessons in weekly classroom meetings. Lifestyle coaches were trained community members or employees of the YMCA.

Weight Watchers

Weight Watchers' diabetes prevention program uses their standard weight management program and includes an additional 45-minute video session focused on educating participants about prediabetes and the role of lifestyle modification in decreasing their risk for diabetes. Average weight loss at one-year was 5.5%.²⁸ Weight Watchers curriculum covers similar topics to those covered in the DPP curriculum. There are weekly in-person meetings at multiple sites. The program includes optional digital tools to track weight, food intake and physical activity. Weight Watcher uses past participants who were successful in Weight Watchers as coaches/group leaders.

Community Health Programs- Montana and HELP PD

Montana Department of Public Health and Wake Forest University/School of Medicine (HELP PD) delivered in-person group classes using community health centers.^{29,30} Their curriculums were similar to the DPP and lead by trained lifestyle coaches (Montana) and community health workers (HELP PD) who were trained and overseen by Registered Dietitian Nutritionists (RDs/RDNs). These diabetes prevention programs sought to use existing resources and facilities. Montana's Diabetes Prevention Program delivers it through 19 organizations across the state. Each one contains 16 weekly and six monthly group sessions over a one-year period.²⁹ HELP PD consisted of 24 group meetings in first six months plus three personalized visits with a registered dietitian.³⁰ An 18-month maintenance phase included one group class and one telephone contact with the community health worker. These programs both resulted in weight loss over 6% at six and 12 months.

Diabetes Prevention delivered through Diabetes Self-Management Programs (AADE NDPP)

Across every state, diabetes self-management programs exist to educate and support people with all types of diabetes. The effectiveness of this model to provide the National DPP was recently published and demonstrated an average weight loss of 5.6%.³¹

Canary Health (formerly Virtual Lifestyle Management)

Canary Health is a lifestyle intervention delivered online by audio-narrated lessons and has an assigned healthcare provider /lifestyle coach who monitors progress and provides support weekly through the first 16 weeks of the program and then biweekly through the remaining eight sessions.³² The curriculum is based on the CDC's DPP curriculum. Average weight loss at one year was 4.5%.

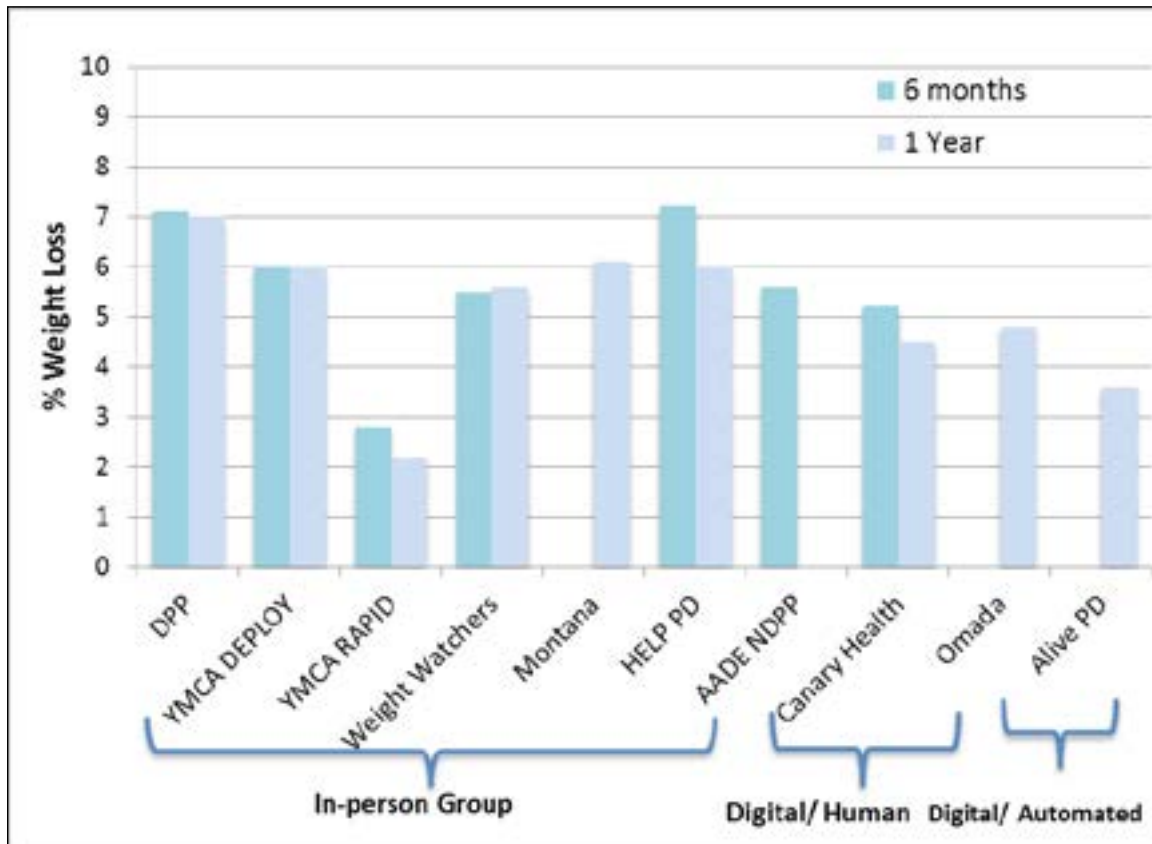
Omada Health

Omada Health provides a DPP-based lifestyle intervention that consists of an online social network of 10-15 people for group support, weekly core lessons that can be accessed online, a wireless scale and pedometer are provided to participants. Each group is assigned a health coach to provide support digitally. The average weight loss was 4.8% weight loss.³³

Alive-PD

Alive-PD is a fully automated program that uses email, web-based resources, smartphones, and interactive voice response technology to support weekly goal setting, reminders and tracking. Participants complete a detailed history and resources provided are individualized. Weight loss at six months was 3.6%.³⁴

Figure 8. Comparison of Weight Loss from DPP Translational Research Studies to the DPP at 6 and 12 Months



Adapted from Institute for Clinical and Economic Review, <http://icer-review.org> and DiBenedetto JC, et al. The Diabetes Educator Online doi:10.1177/0145721716668415

Yes, Diabetes Prevention Programs Are Cost Effective

The findings from the CPSTF²², ICER²³, the US DPP/DPPOS study¹⁷ and all translational diabetes prevention programs that provide cost information demonstrate that these programs are very cost effective. The benchmark for evaluating cost effectiveness is whether the program's incremental cost effectiveness ratio is less than \$50,000/per quality adjusted life year (QALY). The average incremental cost effectiveness ratio reported in the CPSTF review was \$13,761/QALY (interquartile range between \$3067 to \$21,899).²² Group-based programs were more cost effective than individual-based programs.

The ICER report concludes the following (Table 3):²³

- In-person DPP delivered individually is cost effective
- In-person DPP delivered in a group was most cost effective
- DPP adapted to a digital platform with human coaches is cost effective but based on fewer studies
- Unable to calculate cost effectiveness of fully digital programs due to insufficient research

Table 7. Overview of DPP Cost Effectiveness from Health System Perspective

Reference	Name	Population	ICER (\$/QALY)
In-person, Individual Coaching			
DPP Research Group, 2003	DPP Trial	DPP population	\$32,000
In-person, Group Coaching			
DPP Research Group, 2003	DPP Trial as group	DPP population	\$9,000
Hinnant, 2016 Claims analysis	DEPLOY-YMCA	Medicare beneficiaries with prediabetes	Cost Saving
Digital, Human Coaching			
Su 2016, ROI analysis	Omada	Adults with prediabetes & BMI ≥ 25 kg/m ²	Cost saving
Smith, 2016	VLM	Adults with prediabetes & BMI ≥ 25 kg/m ² & ≥ 1 CVD risk factor	\$7,800
Digital, Fully Automated Coaching			
No published cost effectiveness analysis identified			

Adapted from Institute for Clinical and Economic Review, <http://icer-review.org>