North Carolina's Guide to Prevention and Management of Diabetes 3rd Edition

DAC
North Carolina Diabetes Advisory Council

MANAGE WEIGHT | LIVE TOBACCO FREE | PARTICIPATE IN LIFESTYLE CHANGE PROGRAMS
PARTICIPATE IN DIABETES EDUCATION | ENGAGE IN TREATMENT PLAN | GET ADEQUATE SLEEP

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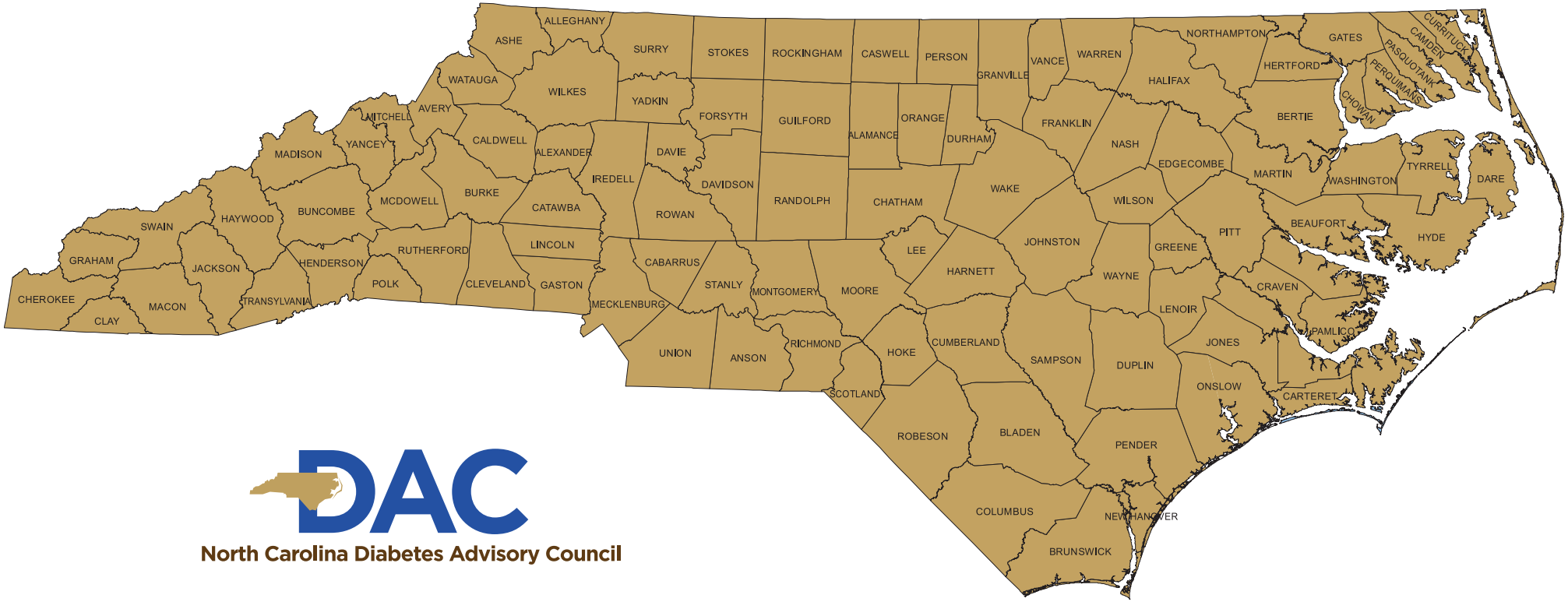

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North Carolina Diabetes Advisory Council

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1 million adults

34.6%

11th in the nation

3,800 per 100,000

Introduction

More than 1 million adults in North Carolina have diabetes (12.4% of the adult population[1]), and 34.6% of the adult population are at high risk for developing type 2 diabetes.[2] In 2022, diabetes was responsible for over 3,800 deaths per 100,000 residents in North Carolina, ranking the state 11th in the nation for diabetes-related deaths.[3]

Diabetes is a complex disease and daily self-management can be challenging. Uncontrolled diabetes is associated with serious complications (e.g., heart disease, hypertension, stroke, vision loss, kidney failure, nerve damage, depression, and hearing loss) that negatively impact quality of life. Diabetes places a substantial personal and financial burden on those affected and their caregivers, as well as significant costs on individuals, employers, health care systems, communities, and all levels of government statewide. In 2017, the estimated total direct medical expenses for diagnosed diabetes in North Carolina were $7.7 billion. The total indirect costs due to lost productivity amounted to $2.9 billion, bringing the overall cost of diabetes to $10.6 billion.[2]

To address the complexities of diabetes and reduce its burdens, North Carolina must consider personal and environmental factors at the individual, relationship, community, and societal levels. Social, economic, and policy environments influence individual behaviors and collectively constitute the Social Determinants of Health (SDoH). Beyond managing diabetes, it is essential to focus on preventing the disease and its complications—or at least delaying its onset—through efforts at the individual, community, and systems level.

Purpose and Mission

This Guide is organized around four levels of social and environmental concepts described by the **Centers for Disease Control and Prevention (CDC) and the Socio-Ecological Model of Health** (SEM) (Figure 1).

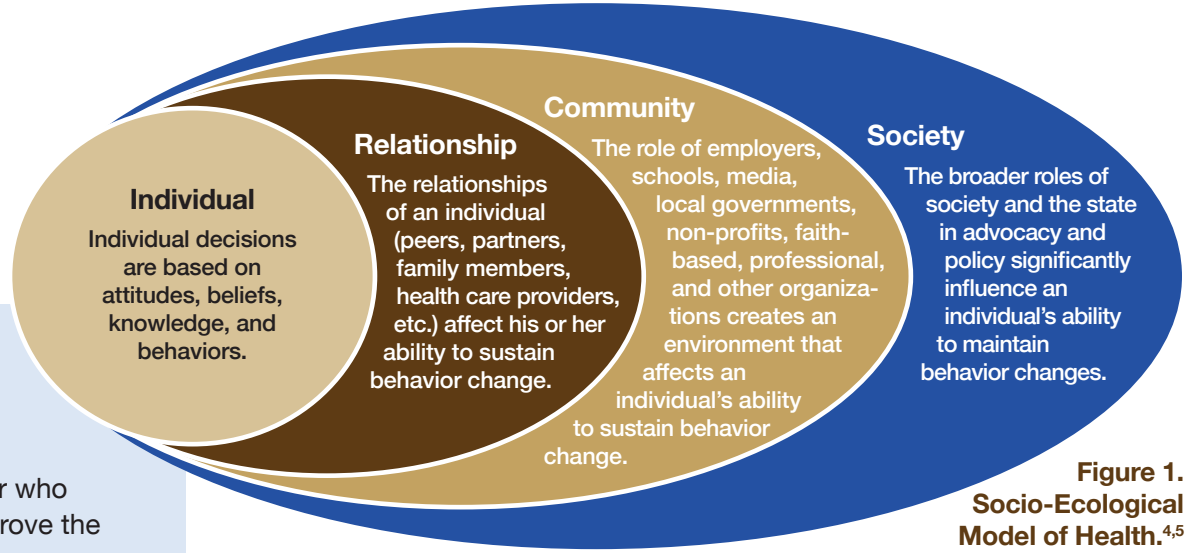


Figure 1. Socio-Ecological Model of Health.[4,5]

The Guide:

1. Addresses what diabetes is and what diabetes looks like in North Carolina.
2. Focuses on actions that individuals at risk for diabetes or who have diabetes, families, and peers can implement to improve the health of North Carolinians.
3. Provides specific strategies for community groups, employers, and health care providers to implement and to assist people in reducing their risk for developing diabetes and/or managing their diabetes, including reducing risk of complication.
4. Shares opportunities to focus on what we can do in our various communities to reduce the burden of diabetes, and the evolving role for our broader society including policy and advocacy in North Carolina.

The Guide's mission is to reduce the burden of diabetes in North Carolina. The **North Carolina Diabetes Advisory Council** (NC DAC) hopes that the information presented in the Guide will increase understanding of the impact of diabetes in North Carolina for our audience (or readers), and what we as individuals, families, and our communities across the state can do to reduce these burdens.

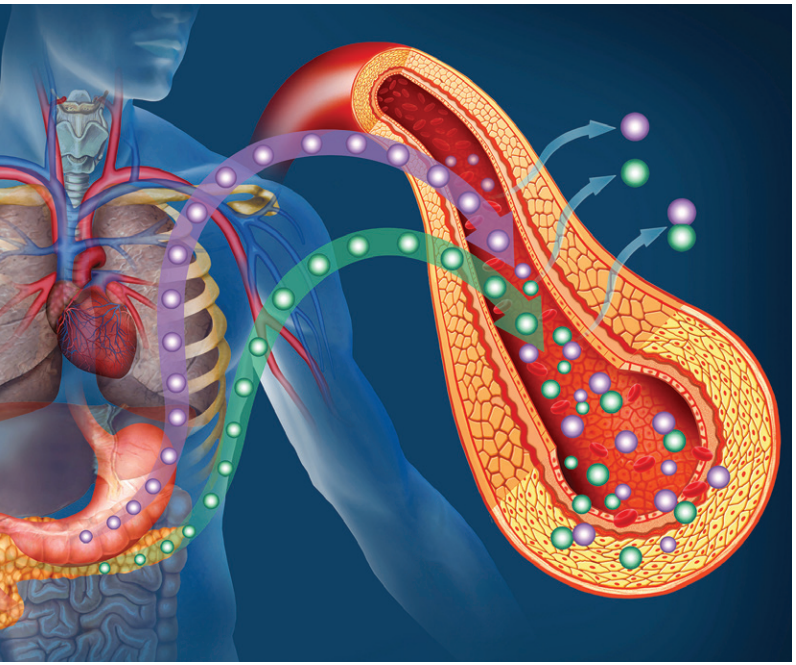
This Guide is also a **Call to Action** to prevent and manage diabetes. We hope, after you read it, you will join the NC DAC in our mission to make a difference.

Modeling the Language of Diabetes

Words matter in diabetes care and management. People diagnosed with prediabetes or diabetes communicate and engage with their health care team, families, friends, employers, and communities to successfully manage their diabetes. Language is the tool that makes effective communication possible and supports the person with diabetes on this journey. All language should be person centric. Using language that promotes inclusion, respect, positivity, and acceptance without judgment fosters effective collaboration between individuals with or at risk for diabetes and their health care team.

Throughout this guide we will model language that enhances written and spoken communication when discussing diabetes. We have added the research recommendations from the joint task force of the American Diabetes Association (ADA) and the Association of Diabetes Care and Education Specialists (ADCES) that address language best practices in the delivery of diabetes care and diabetes self-care management education and support (DSMES).[6]

Sugar is a general term for sweet chemical compounds found in both food and our bodies. Table sugar (sucrose) is composed of equal parts glucose and fructose. The primary sugar utilized by our bodies is glucose, which is regulated by the hormone insulin. In this document, “glucose” will specifically refer to the sugar present in the bloodstream.



According to the **CDC’s diabetes glossary**, **insulin resistance** refers to the body’s inability to respond to and use the insulin it produces, which increases its need for insulin. People who have genetic or lifestyle risk factors are more likely to develop insulin resistance.

Prediabetes and Diabetes Range

Prediabetes is a condition where people have higher than normal glucose levels but not yet high enough for a doctor to diagnose them with diabetes. Prediabetes is sometimes referred to as impaired glucose tolerance (IGT) or impaired fasting glucose (IFG), depending on the test used.[7] Prediabetes is diagnosed when there is no previous diagnosis of diabetes, and a blood test called hemoglobin A1c is measured between 5.7-6.4%. A fasting glucose of 100-125 mg/dl is consistent with prediabetes as is a glucose over 140 mg/dl during an oral glucose tolerance test, as long as there is no other evidence for diabetes. Prediabetes is serious because it increases the chance of developing type 2 diabetes, heart disease and stroke.[8] About 98 million American adults, or 38.0%, had prediabetes in 2021.[9]

Diabetes, also known as diabetes mellitus, is a chronic condition in which the body either does not make any insulin or becomes resistant to insulin resulting in a relative deficiency of insulin. This essential hormone produced by the pancreas helps glucose enter the cells so it can be used to store energy. Keeping blood glucose in a healthy range is key to successfully reducing the risk of complications for people with diabetes. Persistent high glucose levels can lead to severe health complications, including high blood pressure and cholesterol, heart disease, stroke, blindness, kidney failure, and infections. Additionally, conditions such as peripheral neuropathy and peripheral arterial disease elevate the risk of limb amputation.[10] People with prediabetes and diabetes also face an increased risk of various complications, including hearing loss, sleep apnea, oral diseases, certain cancers (such as liver, pancreatic, endometrial, colon, rectal, breast, and bladder cancers), sexual dysfunction, diabetes-related distress (including anxiety and depression), and cognitive impairments (such as dementia).[11,12,13]

Type 1 Diabetes

Type 1 diabetes is caused by an autoimmune destruction of cells in the pancreas that produce insulin[14] and affects approximately 5 to 10% of people with diabetes.[15] Type 1 diabetes requires the person to take insulin, as the body does not produce enough or any of its own insulin. Other than pancreas or islet cell transplants, there is no cure for this type of diabetes. A recently approved medication can delay the onset of high blood glucose symptoms from type 1 diabetes by slowing down or turning off the autoimmune destruction of cells in the pancreas.[16]

Type 2 Diabetes

In type 2 diabetes, there is insulin resistance where the body only responds to much higher levels of insulin and in combination with relative insulin deficiency, the liver produces too much glucose and the body is unable to process or metabolize dietary glucose, resulting in high blood glucose. People with type 2 diabetes can have varying degrees of insulin resistance and insulin deficiency which lead to high glucose. The liver produces too much glucose because of insulin resistance. Type 2 diabetes is the most common form of diabetes, accounting for up to 90 to 95% of diagnosed diabetes.[14] It affects about 1 in 10 people in the US.[21] The risk of developing Type 2 diabetes increases with age, for those who are overweight or obese, or physically inactive across all genders. It occurs more frequently in women with a history of gestational diabetes, among those with high blood pressure (hypertension) or high cholesterol (dyslipidemia) and in certain racial/ethnic groups (African American, American Indian, Hispanic/Latin American and Asian American). It is often associated with a strong genetic predisposition.[22]

Gestational Diabetes

Gestational diabetes mellitus (GDM) occurs in women who did not have diabetes prior to pregnancy, but whose increasing demand for insulin or resistance during their pregnancy becomes greater than what their pancreas can produce. Gestational diabetes is only present during pregnancy and occurs in approximately 8% of pregnancies.[17] During pregnancy, women with GDM require special care and attention to their glucose levels through proper diet, weight management and sometimes temporary use of medications and/or insulin. Without such care women and their babies are at risk for pregnancy complications including maternal death, stillbirth and infant death. After delivery, half of these women[15] may develop type 2 diabetes in 10–20 years.[18,19] Their children are also at increased risk of developing diabetes. It is important to screen women with gestational diabetes 4-12 weeks after delivery because of the increased risk for developing type 2 diabetes. Even if screening is negative at the postpartum visit, both the ADA and American College of Obstetricians and Gynecologists (ACOG) recommend assessing glycemic status every 1 to 3 years and counseling patients regarding diet and/or exercise as needed.[20]

Type 3c Diabetes and MODY

There are other causes of diabetes. Genetic mutations can cause diabetes and are often referred to as neonatal diabetes or monogenic diabetes of the young (MODY). Type 3c diabetes occurs when the pancreas is damaged by other causes like pancreatitis, cystic fibrosis, cancer, or hemochromatosis leading to reduced insulin secretion.[22]

What do prediabetes and diabetes look like and cost in North Carolina?

Prediabetes Prevalence

Approximately 1 in 3 adults in the United States has prediabetes.[25] This condition typically has no symptoms, so many individuals only discover they have prediabetes through blood glucose testing conducted by a health care professional.[22] In 2022, 12.1% of respondents to the **Behavioral Risk Factor Surveillance System** (BRFSS) survey indicated being informed by a doctor or other health care provider that they had prediabetes. Among these individuals, 30.3% were racial and ethnic minorities (North Carolina State Center for Health Statistics, BRFSS 2022).[23] The actual prevalence of prediabetes is likely higher, as over 80% of those with the condition are unaware of it. The CDC estimates that around 34.5% of adults in the United States have prediabetes,[24] with the prevalence in North Carolina potentially surpassing the national average.

Diabetes Prevalence

Approximately 1,028,026 people in North Carolina—about 12.3% of the adult population—have been diagnosed with diabetes, a rate that exceeds the national average. Furthermore, an estimated 244,000 North Carolinians have undiagnosed diabetes, which significantly heightens their health risks. The actual number of people with diabetes in the state is likely much higher, as about 21% of individuals with diabetes remain undiagnosed.[9] Diabetes prevalence and incidence have been increasing among adults for many years, and troubling recent trends show a rising number of cases among children and adolescents as well.[26]

Racial/Ethnic Inequalities in Diabetes Prevalence and Mortality

Diabetes, particularly type 2 diabetes, disproportionately affects all racial and ethnic minority groups in North Carolina.

Specifically, rates are higher among American Indian/Alaska Native, non-Hispanic Black, Hispanic, and non-Hispanic Asian in that order.[23] While diabetes prevalence increases with age for all racial groups, the disease disproportionately affects older African Americans, with more than one-quarter of African Americans aged 55 to 64 and more than a third of African Americans between the ages of 65 and 74 diagnosed.[28,29] Complications of diabetes, particularly lower extremity amputation (LEA)[27] and end stage renal disease (ESRD),[38] are higher for African Americans and American Indians. Statewide, diabetes was the third leading cause of death for American Indians, the fourth leading cause of death for African Americans, and the seventh leading cause of death for non-Hispanic whites.[29,30] In 2018, African Americans and American Indians were more than twice as likely to die from diabetes than non-Hispanic whites.[31]

Geographic Disparities

For both men and women, prevalence is higher among adults living in nonmetropolitan areas compared to those in metropolitan areas.[32] A regional analysis of North Carolina diabetes rates shows geographic differences across the state. In the Piedmont, where most of the state's largest cities are located (including Charlotte, Raleigh, Greensboro and Durham), the prevalence of diagnosed diabetes is 10.7%.[33] In the eastern and western regions, which are largely rural, the prevalence of diagnosis is higher at 13.9% and 12.8%, respectively.[34,35] Regional disparities also include racial disparities. For example, in the Piedmont, 15.4% of African Americans report a diabetes diagnosis, while 11.9% of non-Hispanic whites do so.[36] The Eastern counties of NC make up what the CDC calls the "Diabetes Belt," where diabetes affects at least 15% of the population.[37]

Economic Burden

Diagnosed diabetes costs an estimated $10.6 billion in North Carolina each year. People with diabetes have medical expenses approximately 2.3 times higher than those who do not have diabetes. Total direct medical expenses for diagnosed diabetes in North Carolina were estimated at $7.7 billion in 2017. In addition, another $2.9 billion was spent on indirect costs from lost productivity due to diabetes.[2] A majority (67.3%) of the medical costs are paid by government programs, including Medicare, Medicaid, Indian Health Service and military health programs.[39] National health care costs related to diabetes have risen by $80 billion over the past decade, increasing from $227 billion in 2012 to $307 billion in 2022. Of this total, $106.3 billion (26%) is attributable to lost productivity, unemployment due to chronic disability, and premature death.[40]

Like the rest of the nation, North Carolina continues to face increases in diabetes-related spending. In 2017, diabetes accounted for nearly $11 billion in direct ($7.79 billion) and indirect ($2.90 billion) costs in North Carolina.[41] Between 2010 and 2019, diabetes hospitalizations significantly increased from 3079.0 to 3280.8 per 100,000 US population, with an average stay of 4.7 days.[42] For people with diabetes, the hospital readmission rate ranges from 14% to 20%, nearly double that of patients without diabetes. Contributing factors to readmission include being male, a longer duration of prior hospitalization, a higher number of previous hospitalizations, the presence and severity of comorbidities, and lower socioeconomic or educational status.[43]

How Can Diabetes Be Prevented or Delayed?

This section describes how to prevent diabetes from occurring or dramatically delaying it (primary prevention), including special considerations for those at high risk who should aggressively work on reducing their risk, and also be monitored for early onset of diabetes through early detection or screening. In the following section we will address the management of diabetes in people already diagnosed and strategies to prevent complications through individual and group self-management programs and the importance of persistence with prescribed medical therapy (tertiary prevention).

Primary prevention in type 1 diabetes remains a topic of intensive research, but few recommendations have emerged on how to prevent this form of diabetes. The symptoms of high blood glucose from type 1 diabetes can be delayed in adults and children aged 8 years and older with a medication designed to slow down or turn off the autoimmune destruction of cells in the pancreas.[2] Several long-term population studies and clinical trials show that most occurrences of type 2 diabetes can indeed be prevented or delayed.

A major focus of this Guide and the Diabetes Advisory Council is on type 2 diabetes because it is more common and is potentially preventable. For the remainder of this document, the use of the word “diabetes” will be referring to type 2 diabetes unless indicated otherwise.

Figure 2 shows the progression of diabetes and what individuals can do to prevent and manage diabetes at each stage.

FIGURE 2.

Lifetime Risk Management for Developing and Managing Type 2 Diabetes

The risk of developing diabetes increases with age.

Diabetes primary prevention

Diabetes prevention for people at high risk

Diabetes management and prevention of complications

Genetics

Some individuals are born with increased risk for developing diabetes. Non-modifiable risk factors include:

- Race/ethnicity
- Parent or sibling with diabetes
- Mother who had gestational diabetes

Share your personal and family history of diabetes with your health care team and ask to be screened for diabetes.

Modifiable Risk Factors for Diabetes

Individuals can lower the risk of developing diabetes by:

- Maintaining a healthy weight
- Eating healthy
- Engaging in physical activity
- Living tobacco free
- Getting adequate sleep

Prediabetes (A1C = 5.7-6.4)

Once blood sugar increases to the range shown above, diabetes can still be prevented or delayed by:

- Obtaining and maintaining a healthy weight
- Eating healthy
- Engaging in physical activity
- Living tobacco free
- Getting adequate sleep
- Participating in group education to prevent diabetes

Diabetes (A1C ≥ 6.5)

Once blood sugar increases to the level shown above, diabetes needs to be managed and complications prevented by:

- Maintaining a healthy weight
- Eating healthy
- Engaging in physical activity
- Living tobacco free
- Getting adequate sleep
- Participating in individual and/or group education to manage diabetes
- Adhering to personalized diabetes treatment plans, including medications and insulin, if needed

Diabetes Complications

Manage and prevent diabetes complications, by working with your health care team to protect your:

- Brain and Cognition/ Memory
- Ears/Hearing
- Emotions/Mental Health
- Eyes/Sight
- Feet
- Heart
- Lungs
- Kidneys
- Nerves
- Reproductive organs
- Skin and Nails
- Teeth and Gums

Diabetes Primary Prevention

Type 2 diabetes is the most common form of diabetes and can indeed be prevented if not delayed—sometimes for many years—by paying attention to the following healthy behaviors:

Maintain a healthy weight | Adopt healthy eating habits | Be more physically active | Live tobacco free | Get adequate sleep

Maintain a Healthy Weight

According to ***North Carolina's Plan to Address Overweight and Obesity***, developed by Eat Smart, Move More NC, excess weight can be caused by calorie intake that is greater than energy used, a sedentary lifestyle, and insufficient sleep and stress. A person is about six times more likely to develop type 2 diabetes with obesity than with a healthy weight.[44] Being overweight also increases the chance of developing diabetes. The good news is losing 5 to 7% of your body weight can cut the chances of developing type 2 diabetes in half.[45] Effective weight loss programs are those that assist in the implementation of lifestyle changes such as adopting healthy eating habits, being more physically active, getting adequate sleep, managing stress, living tobacco free, and learning how to change behaviors.

Adopt Healthy Eating

Healthy eating can have a major impact on lowering the risk for prediabetes and type 2 diabetes. There are a variety of healthy eating patterns which can be tailored to each person that incorporate their favorite foods, traditions, and cultural preferences as well as address concerns related to religion or socioeconomic factors. Eating patterns represent the total of all foods and beverages consumed in a day.

A registered dietitian nutritionist (RD/RDN) can provide valuable information about how to eat healthy with prediabetes or diabetes, based on the individual's needs, goals, medications, food patterns, and preferences.[46,47] In this process, the person with prediabetes or diabetes and the dietitian collaborate to design a healthy meal plan which can be integrated into daily life with ease while addressing their specific eating pattern and nutritional needs. All people with prediabetes or diabetes should be referred to a RDN initially and ongoing to establish their healthy eating meal plan and then modify as needed.[46,47] There is no single "best" meal plan for people with prediabetes and diabetes; rather a variety for managing prediabetes and diabetes are acceptable. In terms of evidence-based research regarding the comparative benefits of different eating patterns, the outcome data presently is not strong enough to endorse one eating pattern over another.

Key Factors for Healthy Eating Patterns:[47]

Balanced Nutrients: Meals should include a balance of carbohydrates, proteins, and fats to help manage glucose and lipid levels.

Emphasize Healthy Foods: Focus on non-starchy vegetables, fruits, whole grains, and dairy products. Full-fat dairy is now considered acceptable if it is non-sweetened, with 2 to 3 servings per day being reasonable. Choose foods that reduce the risk of chronic diseases.

Limit Added Sugars and Refined Grains: Minimize intake of sugary and highly processed foods.

Whole Foods Over Processed: Opt for whole foods instead of processed options whenever possible.

Manage Carbohydrates: Reducing carbohydrate intake can improve blood sugar levels and should be tailored to individual needs.

Healthy Eating Practices: Avoid trans fats, control portions, and limit added sugars and sodium. The daily recommended sodium intake is less than 2,300 mg for all adults.

Moderate Alcohol Use: If not contraindicated, limit alcohol to one drink per day for women and two for men. Be aware that alcohol can affect blood sugar and contribute to weight gain.[46,47]

Examples of some eating patterns

- Mediterranean Style
- DASH (Dietary Approaches to Stopping Hypertension)
- Vegetarian or Vegan
- Low Fat
- Low-Carbohydrate
- Diabetes Plate Method

Avoid Sugary Drinks: Consuming one sugary beverage per day increases the risk of type 2 diabetes by 6% to 21%.[48] Replace these with water and limit sugary drinks, though moderate use of natural and artificial sweeteners is acceptable. Non-nutritive sweeteners may contribute to weight gain and diabetes.

Carbohydrate Intake for Diabetes: For those struggling to meet blood glucose targets, low- or very low-carbohydrate diets may be considered with guidance from a health care team.

Fasting Considerations: If fasting for religious or medical reasons, do so under health care provider supervision, especially if using insulin or other blood sugar-lowering medications. Intermittent fasting's impact on diabetes management is not fully established and should be approached with careful monitoring.[49]

Table 1. Healthy Eating Patterns Include:[50,51]

Fruits, vegetables, whole grains and fat-free or low-fat dairy and dairy products.

There is convincing evidence that meal plans rich in whole grains decrease risks associated with diabetes. Eating patterns rich in refined grains lead to increased risk.[51]

Strong evidence supports a meal plan high in fruits and vegetables for weight management. They are lower in calories and high in volume and fiber. These foods are efficient because they are low in calories and make you feel full longer.

Additionally, avoid sugar sweetened beverages (SSB).

Lean meats, poultry, fish, beans, eggs and nuts.

There is growing evidence that consumption of red meat (beef, pork, lamb) and processed red meat (bacon, hot dogs, deli meats) increases the risk of diabetes, even among people who consume only small amounts.

Moderate amounts of saturated fats, sodium and added sugars.

The types of fats in your meal plan can impact the development of diabetes. Healthy fats, including polyunsaturated or monounsaturated fats found in liquid vegetable oils, nuts and seeds can help decrease risks associated with prediabetes and type 2 diabetes.

Calorie needs to achieve and maintain a healthy weight.

Maintaining a healthy weight requires keeping the number of calories consumed equal to the number of calories expended. Research shows that portion size influences how many calories a person consumes. Understanding portion sizes is important for individuals to accurately assess the number of calories he/she is consuming. Because oversized portions are common in restaurants, supermarkets and vending machines, it is important to be aware of and practice appropriate portions during meal preparation.[52]

Mobile apps can significantly benefit individuals managing or preventing diabetes, but with thousands available under the "Diabetes" search in app stores, choosing the right one can be overwhelming. Ahn and Stahl (2019) explored the advantages and limitations of these apps and their integration into clinical practice.[54] These apps support various self-care activities, helping users track their goals, monitor progress, and celebrate successes. Since each app is different, it's important for users to be involved in selecting the one that best fits their needs. Below are some apps that have been particularly effective for individuals with prediabetes or diabetes.

SOME RECOMMENDED MOBILE APPS

Nutrition and Fitness

- **The Best Food Tracking Apps Of 2024, According To Dietitians (womenshealthmag.com)**
- **The 11 Best Nutrition-Tracking and Calorie-Counting Apps to Help You Reach Your Health Goals | U.S. News (usnews.com)**
- **9 Best Food Tracker Apps of 2023 (goodhousekeeping.com)**
- **The 8 Best Calorie Counter Apps (healthline.com)**
- **Calory** (Apple/Android); free version available; full features with subscription
- **Noom** (Apple/Android); available by subscription
- **Yazio** (best for international food tracking) (Apple/Android); free version includes calorie-counting; full features available by subscription
- **Calorie Mama AI** (Apple/Android); free with in-app purchases
- **MyPlate** (Apple/Android); full features with subscription
- **MyNetDiary** (Apple/Android); free basic version; full features available by subscription
- **Lifesum** (Apple/Android); free basic version; full features available by subscription
- **Bitesnap** (Apple/Android) free for Android
- **Foodvisor** (Apple/Android)
- **LogMeal API** (Apple/Android) 30 days free

Diabetes Management

- **The 10 Best Diabetes Apps (healthline.com)**
- **Best Apps for Managing Diabetes of 2023 (verywellhealth.com)**
- **Highly Rated Apps for Diabetes—Diabetes Education Services**
- **Glucose Buddy** (Apple/Android); premium version by subscription
- **BlueStar by WellDoc** (Apple/Android); free version available
- **Tidepool** (Apple/Android); free
- **MySugr** (Apple/Android); free with in-app purchases
- **WellDoc/BlueStar Diabetes** (Apple/Android); Virtual
- **One Drop** (Apple/Android); free with in-app purchases
- **Livongo** (Apple/Android); through employers
- **Omada Health** (Apple/Android); Virtual DPP and DSMES

Stress Management

- **Stress Relief Apps That Can Transform Your Life (verywellmind.com)**
- **Mental Health Apps—The American Institute of Stress**
- **Headspace** (Apple/Android); free
- **Insight timer** (Apple/Android); free
- **iSleep Easy** (Apple/Android); free
- **Happify** (Apple/Android); free
- **Sanvello** (Apple/Android); free
- **SuperBetter** (Apple/Android)
- **Serenita** (Apple/Android); free
- **Woebot** (Apple/Android); free; chatbot with text-messaging interface

RESOURCES FOR HEALTHY EATING

Association of Diabetes Care and Education Specialists (ADCES)

- **Diabetes (eatright.org)**
- **adces7_healthy_eating.pdf**

American Diabetes Association (English and Spanish)

- **Eating Well & Managing Diabetes | ADA**
- **Nutrition Handouts and YouTube Videos — Spanish | American Diabetes Association**

National Diabetes Education Program (English and Spanish and adapted for Chinese, African Americans, Southeastern and South Asian Americans, Filipino Americans, and Korean Americans)

- **USDA MyPlate in Multiple Languages**

Center for Disease Control—Nutrition for Diabetes and Healthy Weight

- **Choosing Healthy Foods on Holidays and Special Occasions | CDC**
- **Cómo elegir alimentos saludables en los días festivos y las ocasiones especiales | CDC**
- **Healthy Weight | Diabetes | CDC**
- **Peso saludable (cdc.gov)**

Be More Physically Active

Increased physical activity plays a major role in the prevention and improvement of insulin resistance, prediabetes, gestational diabetes, type 2 diabetes and diabetes-related health complications. Insulin resistance can be present in both those who have obesity and are overweight, as well as those at a healthy weight (lean diabetes mellitus).[53] Aerobic, resistance training and intentional stretching improve insulin action and can assist with long-term management of blood glucose levels, lipids, blood pressure, cardiovascular risk, mortality and quality of life.

The ADA and the National Academy of Sports Medicine (NASM) recommend at least 150 minutes of moderate intensity, mostly aerobic physical activity, per week, spread over at least three days per week with no more than two consecutive days without exercise. According to the CDC, moderate activity can be assessed using a rating of perceived exertion (**Borg rating**) or how hard one feels they are working based on:

- Increased heart rate.
- Increased respiration or breathing rate.
- Increased sweating.
- Muscle fatigue.[54]

Unless your health care provider recommends otherwise, resistance training should also be included at least twice per week, with one or more sets of at least five different resistance training exercises.[55] Individuals unable to meet resistance training guidelines can perform exercises that focus on improving functional fitness and balance. These exercises may reduce risks of falls and improve balance and gait.[56]

Efforts to promote physical activity should focus on developing self-efficacy and fostering social support from family, friends and health care providers and working with communities on accessible, affordable physical activity options. Encouraging mild or moderate physical activity may be most beneficial to adoption and maintenance of regular physical activity participation. Joining a gym or health club might be motivating and enjoyable, but everyone can increase their level of activity and physical fitness at home, including cardio and strength, with minimal resources and equipment.

Live Tobacco Free

Smoking is a proven risk factor for diabetes, with people who smoke being 30%–40% more likely to develop type 2 diabetes than those who don't smoke.[57] The more someone smokes, the greater the chance of developing diabetes.[58] While smoking can increase the risk of developing diabetes, it can also make diabetes management more difficult. Among those with diabetes, people who smoke are more likely to have problems maintaining proper blood sugar levels and may require larger doses of insulin to manage their blood sugar.

Most importantly, people with diabetes who smoke are at a heightened risk of premature death and morbidity from serious complications such as heart disease and stroke, circulation problems, nerve damage, eye problems leading to blindness and kidney disease.

The American Diabetes Association advises all people not to use cigarettes and other tobacco products or e-cigarettes. In recent years e-cigarettes have gained public awareness and popularity because of perceptions that e-cigarette use is less harmful than regular cigarette smoking. Nicotine can raise blood sugar regardless if delivered by smoking or vaping.[59] However, in light of recent CDC evidence of deaths related to e-cigarette use, no individuals should be advised to use e-cigarettes, either as a way to stop smoking tobacco or as a recreational drug.[60]

Get Adequate Sleep

Sleep is a complex and essential biological process that is required daily for all of us. Learning, memory processing, cellular repair and brain development are among the important functions of sleep.[61] In addition to maintaining normal brain functioning, sleep has important roles in controlling the functions of many other body systems. Reducing the total hours of sleep can lead to serious consequences for almost all bodily organs and systems.[62]

Getting adequate sleep is important. Sleep deprivation can contribute to the development of glucose intolerance, insulin resistance, diabetes and metabolic syndrome. A distinct rise and fall of blood sugar levels during sleep appears to be linked to sleep stages. Not sleeping at the right time, not getting enough sleep overall or not getting enough of each stage of sleep disrupts this pattern. For most adults getting seven to eight hours of quality sleep a day is needed to perform adequately, avoid a sleep deficit and not have problem sleepiness during the day.[63] Those who work night shifts, or change shifts frequently, are at a higher risk of type 2 diabetes.[64]

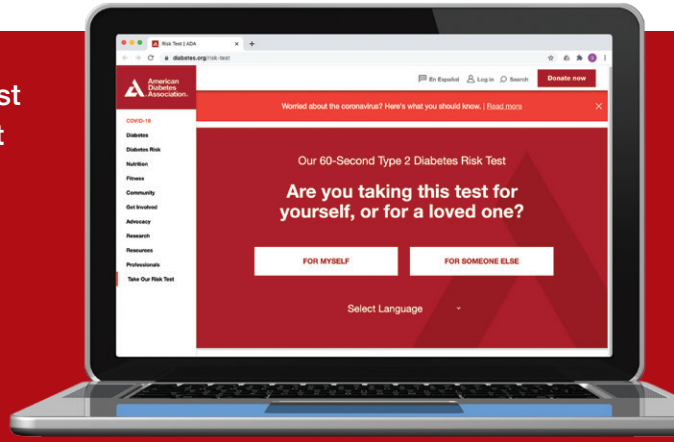
Poor quality sleep may also be associated with overeating and making unhealthy food choices by stimulating hunger signals or suppressing signals of fullness. In turn, overeating especially before going to sleep/going to bed makes it harder to fall asleep or remain asleep.

Obstructive sleep apnea (OSA) is a risk factor for cardiovascular disease, and is very common in those with obesity. People with symptoms suggestive of OSA such as excessive daytime sleepiness, snoring, and/or episodes of not breathing while sleeping, should discuss these symptoms with their medical team. Sleep apnea treatment (lifestyle modification, continuous positive airway pressure, oral appliances, and surgery) significantly improves quality of life and blood pressure management and even the risk of sudden death.[65]

Risk Factor Identification, Early Detection, and Screening[8]

Individuals at high risk for developing diabetes should seek annual screening to detect diabetes at its earliest stages when lifestyle and medication options might be most effective in preventing further progression or complications. Individuals who have one or more of the following: body mass index (BMI) greater than or equal to 25 kg/m^2; family history of diabetes; member of certain racial and ethnic groups; or history of gestational diabetes are particularly at risk for developing diabetes.[66] Even without identifiable risk factors, early detection or screening recommendations for type 2 diabetes suggest that non-pregnant adults 45 years or older be screened, regardless of risk. If screening results are normal, repeat testing should be completed every three years; sooner if adults have any of the risk factors mentioned above or if symptoms of hyperglycemia develop (e.g., excessive urination and thirst, blurred vision, frequent yeast infections, non-healing wounds).

ADA Diabetes Risk Test
diabetes.org/risk-test



Diabetes Awareness for People at High Risk

Some people are at higher risk than others of developing diabetes. In this section we will touch on type 1 diabetes, prediabetes—which is often considered a precursor to type 2 diabetes, gestational diabetes that can occur in some pregnant women, and some of the other conditions associated with diabetes or special risks.

1

Type 1 Diabetes

Type 1 diabetes, which can occur at any age but was formerly known as juvenile diabetes, is caused by an autoimmune reaction in which the body's immune system mistakenly attacks its own cells[22] (islet cell antibodies attack the pancreas cells that produce insulin). Those at highest risk include individuals with a parent, sibling, or other close relative who has type 1 diabetes.[67] While there is currently no way to prevent type 1 diabetes, there is a new medication (teplizumab) that *can delay the progression* to overt and symptomatic hyperglycemia in patients who have islet cell antibodies and dysglycemia (glucoses that are not normal but not consistent with frank diabetes).[16]

2

Type 2 Diabetes

People can have prediabetes for years with no clear symptoms, so it often goes undetected until serious health problems such as type 2 diabetes show up. Risk factors for prediabetes include being overweight, being physically active less than 3 times a week, being age 45 or older, having a parent, brother, or sister with type 2 diabetes, having had diabetes during pregnancy, giving birth to a baby who weighed more than 9 pounds, or having polycystic ovary syndrome. Race and ethnicity are also a factor: African Americans, Hispanic/Latino Americans, American Indians, Pacific Islanders, and some Asian Americans are at higher risk. Once diagnosed with prediabetes, the main treatment goal is to delay or prevent progression to type 2 diabetes primarily through behavioral changes and medications when indicated. Losing a modest amount of weight (5% to 7% of total body weight) through healthy eating and moderate physical activity (such as brisk walking 30 minutes a day, five days a week). A lifestyle change program offered through the CDC-led National Diabetes Prevention Program can help you make those changes—and make them stick. Through the program, you can lower your risk of developing type 2 diabetes by as much as 58% (71% if you're over age 60).[9] North Carolina has over 75 CDC-recognized Diabetes Prevention Program providers that offer either online or onsite classes. Visit **DiabetesFreeNC** to find a program near you.

Gestational Diabetes

You're at risk for developing gestational diabetes[14] (diabetes while pregnant) if you:

- had gestational diabetes during a previous pregnancy
- have given birth to a baby who weighed more than 9 pounds
- are overweight
- are more than 25 years old
- have a family history of type 2 diabetes
- have a hormone disorder called polycystic ovary syndrome (PCOS)[69]
- are African American, Hispanic/Latinx American, American Indian, Alaska Native, Native Hawaiian, or Pacific Islander

Gestational diabetes usually goes away after the baby is born but increases the mother's risk for prediabetes and about 50% of women with gestational diabetes go on to develop type 2 diabetes. Babies born from mothers with gestational diabetes are also more likely to have obesity as a child or teen and are also more likely to develop type 2 diabetes later in life. Before someone gets pregnant, they may be able to prevent gestational diabetes by losing weight if overweight, by eating healthier, and by getting regular physical activity.[67,68]

Other Conditions Associated with Diabetes

Other conditions can cause the body to gradually become more resistant to working with the insulin it produces causing a higher risk of developing type 2 diabetes. A constellation of metabolic abnormalities known as metabolic syndrome—including high LDL (bad) cholesterol, elevated triglycerides, low HDL (good) cholesterol, high blood pressure, excessive body fat, particularly around the waist, and insulin resistance—can lead to high blood sugar. Metabolic syndrome can be a leading cause of prediabetes, characterized by increasing insulin resistance that impairs the body's ability to fully metabolize the glucose consumed. If the body cannot produce enough insulin to overcome this resistance, blood sugar levels will rise to the point where a diagnosis of type 2 diabetes becomes imminent. Metabolic syndrome, prediabetes and many of the conditions listed below can be managed with diet, exercise, and sometimes medications, helping to prevent the onset of complications, including diabetes.

Other metabolic states associated with insulin resistance include medical conditions such as Polycystic Ovary Syndrome, Cushing's Syndrome (an excess of cortisol hormones), Acromegaly (growth hormone excess) and liver disorders called metabolic associated steatotic liver disease (MASLD)/metabolic associated steatohepatitis (MASH).[69]

MASLD is characterized by increased fatty deposits in the liver and is present over half of those with type 2 diabetes.[70] Some individuals with MASLD further develop an inflammatory reaction that can lead to liver scarring, called MASH, which can further progress to cirrhosis. Since MASLD/MASH either coexists with or represents a different manifestation of underlying metabolic syndrome, the rising prevalence of obesity means that fatty liver disorders are increasingly contributing to the global epidemic of type 2 diabetes across all age groups. Currently the American Diabetes Association recommends that patients with type 2 diabetes and elevated liver enzymes or fatty liver on an ultrasound should be evaluated for the presence of MASH and liver fibrosis.[71]

People with other autoimmune diseases such as celiac disease and autoimmune thyroid disease as well as those infected with the hepatitis C virus are also at higher risk of developing autoimmune insulin deficient diabetes. Diseases of the pancreas, such as cystic fibrosis, hemochromatosis, and chronic pancreatic inflammation, can lead to insulin deficiency and eventually diabetes. Individuals with autoimmune diseases should be regularly screened for the development of diabetes.[71]

Lifestyle Change Programs to Prevent Diabetes

In 2010, the Centers for Disease Control and Prevention (CDC) launched the National Diabetes Prevention Program (National DPP) to combat prediabetes and prevent type 2 diabetes through a CDC-recognized lifestyle change initiative. This evidence-based, yearlong program empowers individuals with prediabetes or those at risk of developing type 2 diabetes to implement realistic and achievable lifestyle modifications, potentially reducing their risk by up to 58%.[73]

DPP classes are designed to help participants take charge of their health and well-being by teaching them how to incorporate healthier eating, moderate physical activity, and essential skills such as problem-solving, stress management, and coping strategies into their daily routines. The program is offered in-person or virtually, featuring at least 16 sessions with a trained lifestyle coach in the first six months, followed by at least six additional follow-up sessions. CDC recognition ensures that these programs provide high-quality, evidence-based support.

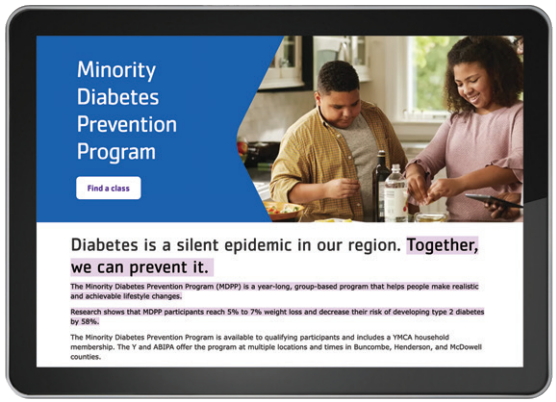
Getting Help Through Education and Diabetes Prevention Programs

Health care providers, Diabetes Care and Education Specialists, registered dietitian nutritionists (RDN), pharmacists, lifestyle coaches, and other health care providers can assist in individual and group diabetes prevention education.

In 2010, the Centers for Disease Control and Prevention (CDC) created the National Diabetes Prevention Program (National DPP) to address prediabetes and type 2 diabetes prevention through a CDC-recognized lifestyle change program. This yearlong lifestyle change program is evidence-based and helps people who have prediabetes and/or are at risk for type 2 diabetes make achievable and realistic lifestyle changes and reduce their risk of developing type 2 diabetes by up to 58%.[73] Diabetes Prevention Program (DPP) classes are designed to empower people with prediabetes to take charge of their health and well-being. Participants learn ways to incorporate healthier eating and moderate physical activity, as well as problem-solving, stress-reduction and coping skills into their daily lives. The DPP classes are delivered either in-person or virtually with a trained lifestyle coach for at least 16 sessions in the first 6 months, then at least 6 follow-up sessions in the next 6 months. The CDC recognition assures that DPPs deliver quality and evidence-based support.

Diabetes Prevention Programs in North Carolina

North Carolina has numerous CDC-recognized Diabetes Prevention Program providers that offer both online and onsite classes. These programs are available in diverse community settings, including local health departments, YMCAs, community centers, faith-based organizations, hospitals, and workplaces. In 2016, the North Carolina General Assembly allocated funding to the Division of Public Health for the North Carolina Office of Minority Health and Health Disparities (NC OMHHD) to establish and manage an evidence-based diabetes prevention program specifically focusing on African Americans, Hispanic/Latin Americans, and American Indians (HB 1030, 2015-241, Section 12E.3). The goal of the Minority Diabetes Prevention Program (MDPP) is to establish a statewide framework to decrease the incidence of diabetes in minority communities. The MDPP strives for health equity in all practices and policies, and was created to address the many barriers and challenges that exist within minority communities to seek and receive equitable programs and services.



Medicare Diabetes Prevention Programs[74]

Medicare's Diabetes Prevention Program expanded model is a structured behavior change intervention that aims to prevent the onset of type 2 diabetes among Medicare beneficiaries with an indication of prediabetes. It differs from other DPPs in that Medicare requires CDC Diabetes Prevention Recognition for reimbursement eligibility. Medicare Part B (Medical Insurance) will cover the costs of a diabetes prevention program only if all specified conditions are met. Eligibility requires blood tests (such as hemoglobin A1C or fasting plasma glucose) within specific ranges, a body mass index (BMI) of 25 or higher (or 23 or higher if you are Asian), and a history of not being diagnosed with type 1 or type 2 diabetes or End-Stage Renal Disease (ESRD). Additionally, individuals must not have previously participated in the Medicare Diabetes Prevention Program. The program begins with 16 core sessions conducted in a group setting over a six-month period. It focuses on helping participants achieve realistic, lasting behavior changes, offering tips for increasing physical activity, strategies for weight management, support from a trained behavior coach to keep the participant motivated, and encouragement from peers with similar goals.

Upon completing the core sessions, participants can access six additional months of less intensive monthly follow-up sessions to help maintain healthy habits. If specific weight loss and attendance goals are met, a participant may also qualify for an extra 12 months of ongoing maintenance sessions.

Common Terms and Acronyms Used for Diagnosing Prediabetes and Diabetes[75]

A1C:
Hemoglobin A1C

BMI:
Body Mass Index

FBG:
Fasting Blood Glucose

FPG:
Fasting Plasma Glucose

GDM:
Gestational Diabetes Mellitus

IFG:
Impaired Fasting Glucose

IGT:
Impaired Glucose Tolerance

OGTT:
Oral GlucoseTolerance Test

TIR:
Time in Range

Diagnosing Diabetes

Recommended Screening Guidelines for Prediabetes and Diabetes

Providers should consider testing overweight or obese adults with a BMI ≥ 25 kg/m^2, or 23 kg/m^2 in Asian Americans, with ***one or more of the risk factors identified below***.[22]

- First degree relative (parent or sibling) with diabetes
- High risk race/ethnicity (African American, Hispanic/Latinx, Native American, Asian American, or Pacific Islander)
- History of cardiovascular disease
- Hypertension (BP ≥ to 130/80 mm/Hg or on therapy for hypertension
- HDL Cholesterol ≤ 35 mg/dl and/or Triglycerides ≥ 250 mg/dl
- Women with Polycystic Ovarian Syndrome (PCOS)
- Physical inactivity
- Insulin resistance associated clinical conditions as noted above, acanthosis nigricans, pregnancy, or women who are overweight and currently planning pregnancy.
- A1C ≥ 5.7%.
- People with HIV, history of pancreatitis, exposure to high risk medication

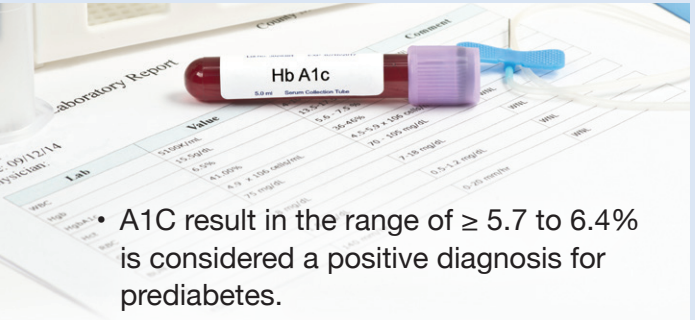
Frequency of Testing

- People with an A1C ≥ 5.7%, or with prediabetes, IGT, or IFG should be tested yearly.
- Women who had gestational diabetes mellitus (**GDM**) *should be tested 4–6 weeks postpartum and then for the remainder of their lives.*
- Otherwise, **testing for diabetes should begin for all individuals beginning at age 45 years**.
  - *If results are normal, those individuals should be tested every 3 years or more* frequently based on risk, lab results, diabetes symptoms, and/or change in health status.

Diagnosis Criteria

There are several methods that can be used to diagnose both prediabetes and diabetes. These involve blood testing at either a health care provider's office or commercial laboratory. **It should be noted that a positive result based on one test alone in the absence of symptomatic hyperglycemia *(high blood glucose levels)* is insufficient.** *Diagnosis is best confirmed based on validation by two abnormal test results.*[22]

Hemoglobin A1C (A1C) is one test used to diagnose prediabetes or diabetes. This blood test measures the average amount of glucose circulating in the blood stream during the past three-month period. (Hemoglobin is a protein found in red blood cells that carries oxygen in the blood. Glucose adheres to the hemoglobin on these red blood cells; so, by measuring the Hemoglobin A1C, it is possible to know the average percent of circulating glucose during this time frame.)



- A1C result in the range of ≥ 5.7 to 6.4% is considered a positive diagnosis for prediabetes.
- A1C result ≥ 6.5% is considered a positive diagnosis of diabetes.

Facts about the A1C

- It is possible for people with prediabetes to lower their A1C value below 5.7% to halt progression toward the development of diabetes.
- The **A1C** test is also used for people already diagnosed with diabetes to assess hyperglycemia (high blood sugar levels).
- It is recommended that individuals with diabetes aim to keep their A1C level below 6.5% without **hypoglycemia** (low blood sugar levels) with the goal of preventing complications. **It should be noted this goal is individualized for each person** based on age, medications, concomitant health issues, and other factors such as barriers to care, personal issues, and social determinants of health.
- HbA1 can be inaccurate in patients with anemia, iron or b12 deficiency, sickle cell, thalassemia, or blood loss.

The **fasting plasma glucose (FPG)** can also be referred to as **fasting blood glucose (FBG)** is also used to diagnose prediabetes and diabetes. Fasting is defined as *no caloric intake for at least 8 hours*. This test is most reliable when given in the morning. FBG is one of the most commonly used tests for diagnosing diabetes.

- FPG less than 100 mg/dl fasting is considered normal.
- FPG ≥ 100 and ≤ 125 mg/dl are diagnostic for prediabetes.
- FPG ≥ 126 mg/dL is positive for diabetes (when found on more than one occasion).

The **oral glucose tolerance test (OGTT)** is another method used to diagnose prediabetes, diabetes, and gestational diabetes. This test is usually performed after overnight fasting and measures blood glucose before and two hours after a person drinks a standardized liquid containing 75 grams of glucose dissolved in water. This test is often used for prediabetes screening as it identifies post meal hyperglycemia, which often presents prior to an increase in the fasting glucose level.

- Normal: a blood sugar level at 2 hours of ≤ 140 mg/dL
- Prediabetes is diagnosed at a two-hour blood glucose level of 140 to 199 mg/dl,
- Diabetes is diagnosed at two-hour blood glucose level ≥ 200 mg/dl.

A random plasma glucose ≥ 200 mg/dL whether fasting or not is also considered diagnostic for diabetes.

Diabetes Management and Prevention of Complications

For people with diabetes, the key to managing their illness, blood sugars and preventing complications is following their health provider's clinical recommendations including medication adherence, screening for early signs of complications and adopting healthy behaviors.

Clinical Considerations

Several excellent guidelines lay out clinical recommendations such as those from the American Diabetes Association Standards of Medical Care in Diabetes.[71]

Scan the QR code for more details from the American Diabetes Association on suggested "Components of the Comprehensive Diabetes Medical Evaluation at Initial, Follow-Up and Annual Visits."[76]

diabetesjournals.org/care/article/47/Supplement_1/S52/153956/4-Comprehensive-Medical-Evaluation-and-Assessment

Time in Range (TIR) and emerging tool for clinical management.

An estimated 30%–40% of people with type 1 diabetes as well as a growing number of those with insulin requiring type 2 diabetes use insulin pumps, continuous glucose sensor monitors (CGM), or integrated insulin pump/CGM devices as tools for diabetes management.[77]

Today, the new "hybrid" models of insulin pumps are designed to deliver insulin, integrate glucose monitoring, and provide diabetes management software that offers comprehensive data analysis related to both insulin doses and daily life activities. Many of these hybrid insulin pumps are now fully integrated with CGMs; offering the person with diabetes and their health care team real-time data to assist in the management of diabetes. Careful review of the comprehensive data provided by these hybrid pumps/CGM integrated systems has unveiled a new metric which can also be used to assess overall glycemic control called **Time in Range (TIR)**.[78]

While A1C can be used to diagnose diabetes, it does not address the constant changes of glucose levels, hypoglycemia, or daily glucose patterns and trends. A 10- to 14-day CGM assessment of TIR, with CGM use of 70% or higher, can be utilized to evaluate glycemic status and is important in clinical management.[79] TIR identifies both the percentage of time and specific time frames where glucose is above or below the individual's recommended target. TIR provides useful information regarding patterns and trends related to food timing, insulin dosing, exercise and daily activity, hypoglycemia, and illness.

TIR is also a more accurate measure than A1C for assessing glycemic control in individuals with those conditions where A1C values are less accurate (iron deficiency and other anemias, hemoglobin abnormalities, and pregnancy).[78] A recent retrospective analysis of Diabetes Control

and Complication Trial (DCCT)[80] and other studies[81] demonstrated that TIR is strongly associated with reduced risk of microvascular complications (e.g., retinopathy and microalbuminuria: small amounts of protein in the urine above what is normal and typically an early sign of kidney disease) in people with T1D and T2D when the TIR percent increased. A TIR value of 70% strongly aligns with an A1C of 7,[82,83] and the clinical recommendation is to keep TIR ≥ 70% for a minimum of 16 hours/day.[78] In clinical practice, TIR is a useful tool that complements A1C as metrics for both targets and outcomes in optimizing diabetes care, management, and outcomes.

A **TIR Tip-Sheet** is available.

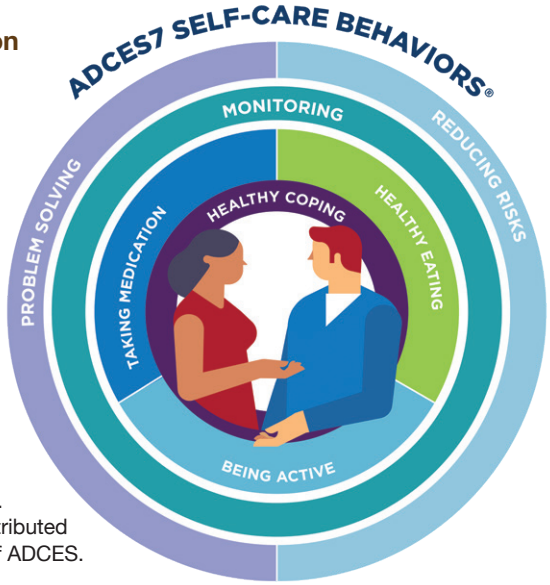
TIR targets:

- T1D and T2D target range = 70–180 mg/dL
- Pregnancy target range = 63–140 mg/dL
- Recommendations also outline setting conservative CGM targets for individuals with diabetes who are older and/or considered high risk, with a strong focus on reducing the percentage of time spent in hypoglycemia/hyperglycemia.

Diabetes Self-Care Management Education and Support (DSMES)—A Critical Tool for Adopting (or Developing) Healthy Self-Care Behaviors

For personalized diabetes management and preventing complications, a critical tool for managing blood glucose and preventing complications is successfully practicing the **ADCES7 Self-Care Behaviors®** (Figure 3) and incorporating those skills and processes into their everyday routines. These behaviors are healthy eating, being active, monitoring, taking medications, problem solving, reducing risk, and healthy coping. These skills assist people with diabetes in their efforts to manage and stabilize their blood glucose levels within the range recommended by their health care team as well as providing recommended clinical preventative measures for overall health maintenance and risk reduction. Evidence-based research demonstrates that managing diabetes by keeping glucose within recommended individual target ranges reduces the risk for complications, slows the progression of the disease and improves health outcomes.[84,85] This is best accomplished through a patient centric collaborative team approach that includes the individual's primary and diabetes health care providers, diabetes self-care management and support (DSMES) team, specialists if indicated and ongoing support.[86]

Figure 3. Transformation of the ADCES7 Seven Self-Care Behaviors.[87]



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DSMES provides people affected by diabetes with the critical survival skills and strategies to manage their diabetes as well as ongoing support as they integrate these processes into daily life. Diabetes care and education (also referred to as diabetes self-management education and support or diabetes self-management training, or DSMT), is performed by health care professionals who have appropriate credentials and experience within their scope of practice. **DSMES services** are provided by a variety of credentialed professionals such as nurses, registered dietitian nutritionists (RDN), pharmacists, and Certified Diabetes Care and Educational Specialists (CDCES). DSMES services are designed

Definitions and Terms used in Diabetes Self-Care Management and Support (DSMES)[75]

Lifestyle Management includes: DSMES, DSMT, MNT, physical activity, smoking cessation counseling, psychosocial care.

DSMES: Diabetes Self-Management Education and Support

The combination of education (DSME) and support (DSMS). With the inclusion of "support" in the most recent update in the National Standards for DSMES, this is now the preferred terminology

DSMT: Diabetes Self-management Training

Term used by the Centers for Medicare & Medicaid Services for DSMES. Preferred term for legislative activity and reimbursement/billing issues.

MNT: Medical Nutrition Therapy

CDCES: Certified Diabetes Care and Education Specialist

DCES: Diabetes Care and Education Specialist

to address the person's health beliefs, cultural needs, current knowledge, physical limitations, emotional concerns, family support, financial status, medical history, health literacy, numeracy, and other factors and barriers that influence each person's ability to meet the challenges of self-care.[88] These providers can be found in a variety of settings: hospitals, physician offices, clinics, pharmacies, home health, wellness programs, health departments, or communities. The initial DSMES referral is provided by a primary care provider (PCP) to a formal DSMES program. Ongoing support services can be provided within PCP or endocrinology practices as well as in a variety of community-based resources such as rural health centers, health departments, support groups, faith-based programs, payer-based programs, or by community health workers.

Evidence-based research demonstrates that engaging adults with diabetes in DSMES results in statistically significant and clinically meaningful improvements in A1C. The greatest improvements are achieved when DSMES includes both individual and group education, is provided by a team, participants attend more than 10 hours, and is individualized to address each person's unique needs. Additionally, DSMES is focused on behaviors, lifestyle changes, and engages the person with diabetes in the process.[89]

When to Refer for DSMES

There are four critical times when DSMES should be provided for type 2 diabetes (Figure 4):

- At diagnosis
- Annually and when not meeting targets
- When complicating factors occur
- When transitions in care occur

Figure 4. Four Critical Times for DSMES Services[90]

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Table 2. Target Goals for Glucose (Fasting, Pre-meal, Post-meal) and A1C goals[91]

Fasting glucose before your meal:	80 to 130 mg/dl
Glucose two hours after the start of the meal:	Below 180mg/dl
A1C goal:	< 7% without frequent hypoglycemia—individualized for each person
A1C goal–adjusted:	< 8% for people sensitive to hypoglycemia, elderly, history of severe heart disease, long duration of diabetes
Talk with your health care team about what blood sugar numbers are right for you.	

These times identified in Figure 4 are critical points when people with diabetes may need assistance to achieve and/or adjust their goals and care plans for successful daily self-management.[88] Because diabetes is a chronic disease that progresses over time, ongoing vigilance and flexibility are necessary to address and adjust changing needs or treatments. Increased DSMES referrals may be necessary to assist the person with diabetes to meet healthy goals and outcomes to prevent complications. Diabetes care and education plans at each of the 4 critical times include individual assessments that focus on the needs and experiences of the person with diabetes relevant to self-management and applicable treatment targets.[60]

Self-Care Recommendations for Individuals with Diabetes

It is recommended to follow-up with your diabetes care team every 3 months to live healthy with diabetes. During these visits, people with diabetes should expect to have:

- A1C checked and compared to blood sugars from home
- Blood pressure checked
- Blood and/or urine chemistries to assess kidney function, with a referral to a specialist as needed
- Lipid (cholesterol) levels (at least once a year)
- Foot exam (take off those shoes and socks) and importance of daily self-foot exam at home to inspect for changes in skin or temperature, infections, fungus, cracks, fissures, corns or callous, ingrown nails, edema or decreased sensation
- Depression or distress screening; let your provider know if you are overwhelmed by managing your diabetes, are feeling depressed, or find it challenging to cope
- Screening for tobacco use or vaping • Reminder to see your dentist two times/ year and to brush and floss teeth daily
- Assessment for sleep apnea, with a referral to a specialist as needed
- Referral to an audiologist at the time of diagnosis for hearing evaluation and screening for risk of falls (future evaluations might be required based on the full medical history)
- A review of your individualized, patient-focused plan of care for managing your diabetes
- Referral to an eye care provider at least once a year who can perform a dilated eye exam
- Review of all your immunizations to ensure you are up to date: flu vaccine (yearly), pneumonia vaccines, hepatitis B vaccine, and discuss the need for a Tdap and/or MMR booster, shingles and HPV vaccines with your provider
- Referral to see your DSMES team at the four critical times (e.g., when complicating factors occur) and annual follow-up review.

Preventing and Reducing Risks for Complications

Diabetes can lead to complications over time particularly when glucose levels remain elevated for extended periods of time and /or there is extreme glucose variability. Diabetes is associated with:

- Amputations: diabetes and complications of ulcerations lead to 50–75% of the non-traumatic amputations
- Depression
- Distress
- Falls: Increased risk from loss of vision, foot neuropathy, and vestibular complications leading to potential fractures and head injury
- Fatty liver: Non-alcoholic Fatty Liver Disease (NAFLD)
- Gastroparesis (slower or incomplete emptying of the stomach) and impaired digestion secondary to central autonomic neuropathy
- **Hearing Loss**
- Macrovascular changes of the large blood vessels which can lead to cardiovascular disease (heart attack, strokes, hypertension), clotting disorders, amputations, hearing loss
- Microvascular changes to the small blood vessels which can impact the eyes (retinopathy), ears (hearing), kidneys, end stage renal disease and dialysis (nephropathy), feet, hands, and nerves (neuropathy)
- Periodontal (gum) disease, loss of dentition
- Peripheral vascular disease (altered or decreased circulation to the feet and legs, edema, nails and skin
- Skin changes (skin tags, oral skin lesions, itching, infections due to bacteria, fungus, or yeast)
- Sleep apnea
- Other endocrine or autoimmune disorders

Immunizations are important for people with diabetes as protection from complications of flu, pneumonia, Hepatitis B, Shingles, Tetanus, Pertussis, and Diphtheria. All illnesses and infections in individuals with diabetes cause glucose to rise to high levels (hyperglycemia), which in turn increases the difficulty to resolve these illnesses, which is why immunizations are important.[71,92]

- Annual flu vaccine
- Hepatitis B vaccination for all adults with diabetes who have not previously been vaccinated for Hepatitis B and are younger than 60 years of age.
- Pneumococcal vaccines once as an adult before 65 years of age and then two more doses at 65 years or older
- Shingles vaccine
- Tdap (Tetanus, diphtheria, and pertussis): Initially and then every 10 years

For additional information about immunizations and diabetes, visit the **Association of Diabetes Care & Education specialists website**.[93]

The Language of Diabetes

Diabetes is a challenging and complex medical condition that demands intense engagement in the daily management on the part of the person with diabetes. The learning curve is rapid and steep; requiring mastery of multiple critical self-care skills and problem-solving strategies to successfully navigate this condition. People with diabetes must also integrate these new responsibilities into their other roles and obligations (spouse, parent, grandparent, manager, employer, employee, community member, household manager, caregiver, teacher, mentor, etc.). Individuals *and* families who live with diabetes every day need ongoing support and encouragement from their health care teams, community, families, friends, and co-workers.

Language is the primary channel for sharing knowledge and verbalizing understanding.[6] Once heard or read, people transform words into meaning,[94,95] impacting their self-concept. Language is the center whereby a person determines their identity, social perception, attitudes, bias, and stereotypes. The use of certain words or phrases can intentionally or unintentionally express bias about personal

characteristics (e.g., race, religion, health, or gender).[6] Language shapes the experience for the person with diabetes and impacts both the context and their perception of the information. Studies have demonstrated that the language used in diabetes care and management makes a huge difference in terms of behaviors, outcomes, and motivation.

The Association of Diabetes Care and Education Specialists (ADCES) and the American Diabetes Association (ADA) formed a joint task force focused on language in diabetes care and education. This group reviewed the literature regarding language used in the delivery of diabetes care and education and made recommendations for language that enhances the communication process. Appropriate language should be used by all health care professionals and others when discussing diabetes through spoken or written words and can be used with a variety of audiences (people with diabetes, colleagues, or the public).[6]

- Stigma that historically has been attached to a diagnosis of diabetes can contribute to stress and feelings of shame and judgment
- Every member of the health care team can serve people with diabetes more effectively through a respectful, inclusive, and person-centered approach
- Empowering language that focuses on the individual's strengths can improve communication and enhance motivation, health, and well-being of people with diabetes.
- Specific themes and associated words should be avoided.

Words to Avoid

- **Judgment** (non-compliant, uncontrolled, don't care, should, failure)
- **Fear/Anxiety** (complications, blindness, death, diabetic ketoacidosis)
- **Labels/Assumptions** (diabetic, all people with diabetes are fat, suffer)
- **Oversimplifications/Directives** (lose weight, you should, you'll get used to it, at least it's not...)
- **Misunderstanding/Misinformation/Disconnected** (cure, reverse, bad kind, you are fine)
- **Body Language and Tone** (no eye contact, accusatory tone)

BE AWARE AND CHOOSE YOUR WORDS WITH CARE

Table 3. List of Problematic Words and Preferred Words to Use.

Problematic	Preferred
Diabetic	Person living with diabetes
Test blood glucose	Check or Monitor
Control (Verb)	Manage–describe what the person is doing
Control (Noun)	Define what you mean with control and use A1C, blood glucose level
Good / Bad / Poor	Safe/unsafe levels; target levels; use numbers and focus on facts instead of judgmental terms
Compliant / Adherent	Takes medicine about half the time; Eats vegetables a few times a week; describe engagement and participation

Our words and messages are powerful. When our mindset places the person first, the language will follow, removing the labels of shame, guilt, and blame. When we hear language that is negative, speak up and advocate for people with diabetes while educating those around us.[96] Additional resources can be found at the **Association of Diabetes Care & Education Specialists**.[97]

Medication

There are many drug classes available to help manage diabetes. New research continually adds to the list of medications, their uses, recommendations, risks, and benefits. As a result, we suggest reviewing the American Diabetes Association's (ADA) Pharmacologic Approaches to Glycemic Treatment within the ADA Standards of Care and Resources. These are available online (remember to select the current year) and as an Android or iOS app:

Find it on the **Web**

Get the **Android-App**

Get the **iOS-App**

Diabetes drugs like GLP-1 AGONISTS (e.g. Ozempic), and SGLT2 inhibitors (e.g. Farxiga) are popular for treating obesity, heart disease, and chronic kidney disease (CKD). Currently, Mounjaro (Tirzepatide) is the first and only dual GLP-1/GIP agonist approved by the FDA for type 2 diabetes. Addressing insurance and payment is crucial to helping patients afford treatments. Here is how health care providers can assist patients in navigating these aspects:

1. Insurance Coverage

Check Insurance Plans:
Verify coverage before prescribing, check whether the patient's insurance plan covers the specific weight loss medication. Coverage can vary widely between different insurance providers and plans.

Formulary: Determine if the medication is on the insurance company's formulary (list of covered medications) and if there are any preferred options or tiered pricing.

Prior Authorization:
Process Requirements: Many weight loss medications require prior authorization. Be prepared to complete and submit the necessary documentation.

Medical Necessity: Provide detailed information to justify the medical necessity of the medication, including the patient's BMI, comorbidities, previous weight loss efforts, and the rationale for choosing the specific medication.

Appeals:
Denied Claims: If a claim is denied, assist the patient in understanding the appeals process. This may involve providing additional documentation or a letter of medical necessity.

2. Cost Assistance Programs

Manufacturer Assistance Programs:
Many pharmaceutical companies offer patient assistance programs or savings cards that can reduce out-of-pocket costs for weight loss medications.

Resources: Direct patients to the manufacturer's website or provide contact information for these programs.

Nonprofit and Community Resources:
Some nonprofit organizations and community health programs offer financial assistance or discounts on medications.

Referrals: Refer patients to resources such as NeedyMeds or the Partnership for Prescription Assistance.

3. Alternative Payment Options

Generic Medications:
If available, consider prescribing generic versions of weight loss medications, which are often less expensive than brand name drugs.

Discount Programs:
Pharmacy Discount Cards: Programs like GoodRx or SingleCare offer discounts on prescriptions and can be used instead of insurance.

Comparison Shopping: Encourage patients to compare prices at different pharmacies, as prices can vary.

4. Patient Communication

Discuss Costs Upfront:
Have an open conversation about the potential costs of weight loss medications and any financial concerns the patient may have.
Transparency: Be transparent about the potential need for prior authorization or out-of-pocket costs.

Provide Written Information:
Give patients written information on their insurance plan's medication coverage policy, including contact information for their insurance provider and steps to take if they encounter issues.

5. Follow Up and Support

Ongoing Assistance:
Offer support for navigating insurance and payment issues throughout the treatment process, including assistance with prior authorizations and appeals if necessary.

Office Staff: Utilize office staff, such as a patient navigator or case manager, to help patients with insurance and financial concerns.

Monitor Financial Impact:
Regularly check in with patients about the financial impact of their treatment to address any issues promptly and adjust the treatment plan if necessary.

Key Takeaways for Patients

1. **Insurance Verification:** Confirm with your insurance provider whether the prescribed weight loss medication is covered and understand any prior authorization requirements.
2. **Cost Assistance:** Explore manufacturer assistance programs, discount cards, and nonprofit resources to reduce medication costs.
3. **Open Communication:** Discuss any financial concerns with your health care provider to find the most affordable and effective treatment options.
4. **Documentation:** Keep copies of all documentation related to insurance coverage, prior authorizations, and any communications with the insurance company.

By addressing insurance and payment considerations proactively, health care providers can help ensure that patients have access to the weight loss medications they need without undue financial burden.

If a patient's pharmacy does not have the prescribed weight loss medication in stock, there are several steps both the patient and health care provider can take to resolve the issue:

1. Contact the Pharmacy

Check Availability: Have the patient or a staff member call the pharmacy to confirm the medication is out of stock and inquire about the expected restock date.

Alternative Locations: Ask if the pharmacy can check the availability of the medication at other nearby locations or transfer the prescription to another branch that has it in stock.

2. Explore Alternative Pharmacies

Different Pharmacies: Suggest that the patient contact other local pharmacies to see if they have the medication available. This can include independent pharmacies, larger chain pharmacies, and specialty pharmacies.

Online Pharmacies: Consider reputable online pharmacies, which may have the medication available. Ensure the online pharmacy is certified by the National Association of Boards of Pharmacy under its Digital Pharmacy Accreditation program (Reference: 21 N.C. Admin. Code 46.1601).

3. Communication with Health Care Provider

Inform the Prescriber: The patient should inform the health care provider about the issue. The provider can then assist in finding a solution.

Alternative Prescriptions: If the medication is not available in the area, the health care provider may consider prescribing an alternative medication that is in stock and appropriate for the patient's condition.

4. Pharmacy Interventions

Special Orders: Some pharmacies can place special orders for medications that are not in stock. This might take a few days, so it's important to ask about the timeframe.

5. Insurance and Payment Considerations

Coverage Check: Ensure that any alternative pharmacy or medication is covered by the patient's insurance plan to avoid unexpected costs.

Prior Authorization: If an alternative medication is prescribed, confirm if a new prior authorization is required and complete it promptly.

6. Patient Communication

Keep the Patient Informed: Maintain clear communication with the patient about the steps being taken to obtain their medication. Provide updates on any expected delays or changes in the prescription.

Provide Instructions: If the prescription is transferred to another pharmacy, provide the patient with clear instructions on where to go and what they need to do to pick up their medication.

7. Follow Up

Confirm Receipt: Follow up with the patient to confirm that they have received their medication and address any further issues that may arise.

Summary of Steps for Patients

1. **Contact the Pharmacy:** Verify that the medication is out of stock and inquire about restock dates.
2. **Check Other Locations:** Ask if the medication is available at other pharmacy branches or nearby pharmacies.
3. **Inform the Prescriber:** Let your health care provider know about the issue so they can assist.
4. **Consider Alternatives:** Look into different pharmacies, including certified and accredited online pharmacies (e.g. Amazon).
5. **Stay Informed:** Keep in communication with your health care provider and pharmacy for updates.

Supply considerations

The supply situation for weight loss medications can vary widely depending on several factors, including the specific medication, manufacturer production capacity, distribution logistics, and regional demand. While supply issues for weight loss medications can occur, proactive communication with pharmacies, manufacturers, and patients can help mitigate these challenges. Staying informed about the latest updates from manufacturers and professional associations can also provide valuable insights into managing and addressing supply constraints.

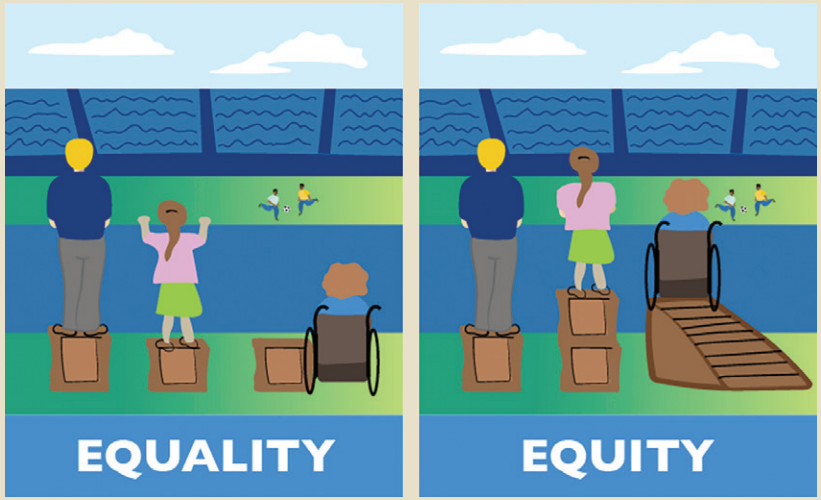
FDA Drug Shortage List: The FDA maintains a **list of current and resolved drug shortages**, which includes information on the current status of various medications, including weight loss drugs.

Importance of Social Determinants of Health and Health Equity to Prevent and Manage Diabetes

Traditionally, public health and health care agencies have focused on understanding and addressing **health disparities**, that is, alleviating the gap in health outcomes and/or processes of care among different groups of people.[98] With racial/ethnic health disparities, health disparities have been defined as the difference in both outcomes and health care processes of care among non-Hispanic whites and racial and ethnic minority groups. For diabetes, racial and ethnic health disparities have been pronounced and persistent, particularly for African Americans, American Indians and Hispanics/Latin Americans.[9]

Recently, the focus has shifted to **health equity**, defined as the achievement of the highest level of health for all people.[99] Health equity requires that efforts are made to address factors such as racism and power imbalances and to focus attention on "upstream" issues that contribute to the long-standing health disparities that exist in our society. Health equity also requires that extra efforts must be made to achieve this goal among our most vulnerable populations (Figure 5).

Figure 5. Equity and Equality

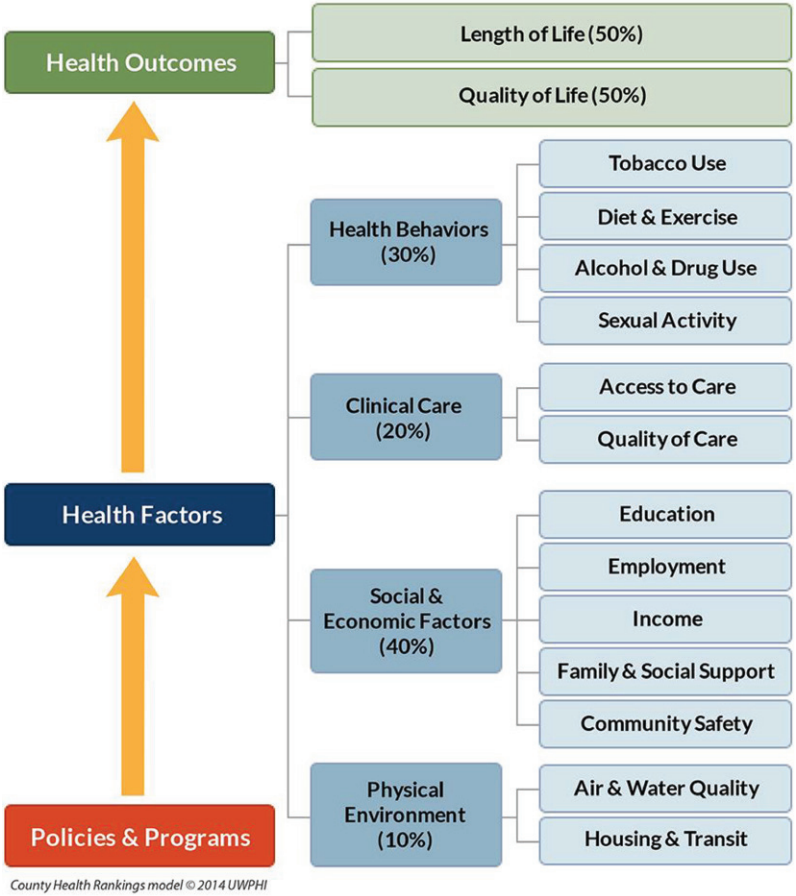


Johns Hopkins Medicine

To that end, greater emphasis is being placed on these "upstream" issues, known as the **social determinants of health (SDOH)**, which are conditions in which people live, learn, work, and play and how those conditions affect health risks and outcomes. Social and economic factors are believed to contribute to 40% of the quality and length of life in communities[100] (Figure 6). The 2018 Health Equity Report released by the NCDHHS Office of Health Equity (formerly the Office of Minority Health & Health Disparities)[31] and the recently released Healthy North Carolina 2030 Report[101] focused on the drivers of health as outlined in the County Health Rankings Model (Figure 6).

There is strong evidence that diabetes prevention and management is influenced by the social determinants of health.[103] Disparities in diabetes indicators are very prominent across educational, economic and geographic groups, with the greatest burden experienced by those with limited formal education, those living below the poverty line and those living in rural communities with limited access to health care and resources to live healthy lives. In order to be as effective as possible in achieving our goals to reduce the burden of diabetes in our state, it is incumbent upon us to both recognize the impact of social determinants on diabetes prevention and management, but to also work collectively to ensure that health equity can be achieved through a concerted focus on the upstream factors.

Figure 6.
County Health Rankings Population Health Model[103]



Working to Address Social Determinants of Health and Health Equity at Multiple Levels

Community organizations play a crucial role in reducing the burden of diabetes in our state. This guide offers actionable steps that your organization can take to support individuals with diabetes and contribute to statewide prevention efforts. Examples of what you and the organizations you belong to can do appear in the following sections.

We use the Socioecological Model of Health (Figure 7) to connect individual behaviors essential for preventing and managing diabetes with broader policy strategies that community groups, employers, and health care providers can implement to enhance diabetes care and prevention.

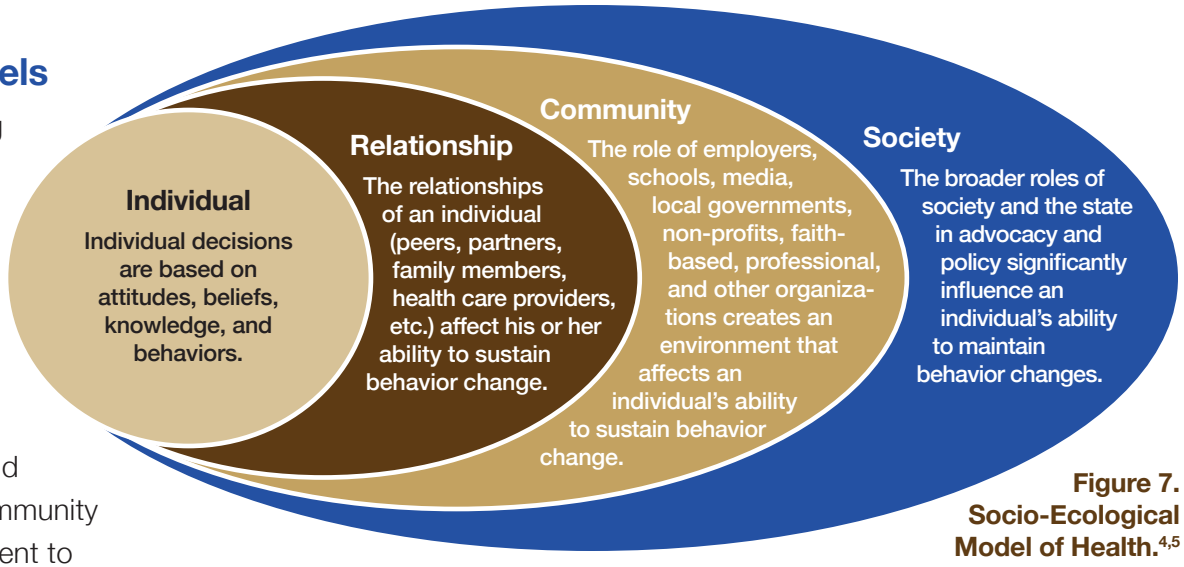


Figure 7. Socio-Ecological Model of Health.[4,5]

According to the Socioecological Model (SEM), individuals at risk for or living with diabetes need to adhere to specific behaviors to maintain their health. The influence of interpersonal relationships—such as those with family and friends—on these behaviors is significant. While this guide does not focus on actions for friends and family, numerous resources are available for them, such as **Diabetes Sisters**, **Children with Diabetes**, and **Taking Control of your Diabetes**). A comprehensive list of these websites can be found in Appendix A.

The population-based strategies outlined in the following sections are designed to empower organizations to support diabetes prevention and management. These strategies are organized by the groups that can take action (community, health care, employers, and society) and are aligned with the stages of diabetes prevention and management. A description of each group is provided before the list of strategies.

Together, these strategies help state agencies, community groups, and other organizations apply population health principles and risk stratification techniques to complement the efforts of health care providers. This collective approach extends the impact of diabetes prevention and management beyond individuals and families, significantly reducing the overall burden of diabetes.

Individual

Individual decisions are based on attitudes, beliefs, knowledge and behaviors.

Relationship

The relationships of an individual (peers, partners, family members, health care providers) affect their ability to sustain behavior.

Community

The role of employers, schools, media, local governments, non-profits, faith-based, professional and other associations creates an environment that supports an individual's ability to sustain behavior change.

Society

The larger role of our society and the state in advocacy and policy has an impact on an individual's ability to sustain behavior change.

The Socioecological Model, along with the concepts of social determinants of health and health equity, offers valuable insights into how organizations can effectively address diabetes. Collective action always drives more sustainable change than isolated efforts. The following sections of this guide explore the potential contributions of "Community" and "Society" in this effort. As we collaborate, it is essential to focus on solutions rather than problems.[104] Key principles to consider:

1. **Health begins long before illness—in our homes, schools, and workplaces.**
2. **Everyone should have the opportunity to make choices that lead to a long, healthy life, regardless of income, education, or ethnic background.**
3. **Your neighborhood or job should not be a threat to your health.**
4. **The opportunity for good health starts well before the need for medical care arises.**
5. **Health starts where we live, learn, work, and play.**
6. **The foundation for health is built in our families, neighborhoods, schools, and workplaces.**

What Can Local Communities Do?

Community action is seen as necessary to the success of health care transformation. Communities that act through public participation on issues that affect their well-being see more relevant outcomes. Local knowledge and skills need to be equally valued in the planning and decision-making process to ensure that outcomes are aligned with communities' needs and assets. Integration of members of the community including local faith organizations, health departments, community health workers, and health systems in the planning process can help lead to more successful changes.[106]

Supportive environments—where we are born, grow, work, and play—are essential for promoting well-being and preventing chronic diseases like diabetes. These environments thrive when they are stable, safe, enjoyable, stimulating, and satisfying, fostering active living and reducing the risk of diabetes. Creating healthy environments is a shared responsibility. Everyone has a role to play—whether through our communities, schools, workplaces, health care systems, local governments, or the media.[105]

Community groups, faith-based and non-faith-based organizations, and non-profits are pivotal in building these healthy environments. They can significantly impact diabetes prevention and help those living with diabetes lead healthier lives. However, populations at high risk for diabetes often face barriers such as a lack of safe walking areas, green spaces, adequate lighting, and opportunities for social interaction and public transportation, all of which are crucial for active living. Supportive social and community environments that foster social interactions can also reduce depression, a common comorbidity of diabetes. Additionally, communities with easy access to grocery stores offering fresh fruits and vegetables encourage healthier diets.

The community has many components. This guide outlines actions that various sectors—schools, media, local governments, faith-based organizations, and non-profits—can take to contribute to healthier environments. Other sectors, such as health care providers, insurers, and employers, also play a critical role from a population-based or community perspective. These roles are explored further in this section and in the sections titled "What Can Health Care Providers and Insurers Do?" (p. 37), and "What Can Employers Do?" (p. 43).

Schools, Community Colleges, and Universities

Though schools and universities belong to the larger area of communities, there are some specific actions schools can do to affect the health and wellbeing of their students and families. Healthy lifestyles start at the beginning. As children and young adults spend a large amount of time within the school walls, schools, school boards, and colleges/universities have a unique opportunity to influence the current and future health of students.

The incorporation of school nurses and/or student health services in the development of programs for those at risk for diabetes or with diabetes is essential. Educational institutions of all types should have adequate policies in place to support the diabetes prevention behaviors outlined above as well as sufficient staff, equipment and resources to provide routine and emergent care for their students who may have diabetes.

The Media

The media plays a vital role in raising awareness about diabetes, educating the public on the disease, its risk factors, and highlighting the seriousness of the epidemic. It has a critical responsibility to incorporate accurate, impactful messaging about diabetes in public service announcements, broadcasts, and printed materials. Media coverage can draw attention to the urgent need for increased resources to support diabetes research and care. Collaboration between individuals with diabetes, health care providers, community leaders, and the media is essential to ensure that messages are factual, engaging, and resonate with both general and targeted audiences. Sharing personal stories of struggle and triumph can be particularly powerful in raising awareness. Whether local or national, in print or digital (radio, TV, online), media outreach is crucial not only in reaching those at risk or living with diabetes but also in influencing policymakers.[107] Media can spotlight health disparities, such as access to healthy food, physical activity, health care, and the rising cost of medications like insulin, furthering the cause of diabetes prevention and management.

Local and State Government

Local and state governments have a significant impact on community health by fostering dialogue on a wide range of health opportunities and supporting the implementation of programs and policies. These efforts extend beyond what government alone can achieve, encouraging community action to enhance the health and well-being of the entire population. Leaders at the local and state levels can help reduce the burden of diabetes in North Carolina by forming partnerships, providing support, and distributing this plan to communities and stakeholders.

Faith-based Organizations[108, 109]

Faith-based organizations are central to communities, particularly within the African American population, where they play a key role in health promotion. These organizations are well-positioned to address health disparities and promote health equity. Faith-based groups are also known for their outreach in addressing various health barriers, including financial, social, employment, illness, hunger, transportation, and child or elder care.[110, 111] The trust and respect between faith leaders, clergy, and congregants create a strong foundation for discussions, education, and support around all aspects of diabetes.

Non-profit/Other Organizations

Non-profit organizations are another crucial element in the community support network, providing essential services such as food, housing, clothing, transportation, financial assistance, computers, and employment support. Other organizations focus on advocacy, health policy, and ongoing support for individuals with diabetes. At local, state, and national levels, these organizations work tirelessly to reduce the burden of diabetes and improve the quality of life for North Carolinians with prediabetes or diabetes.

North Carolina has a plan to address overweight and obesity by advocating how we balance how we eat, drink and move called ***North Carolina's Plan to Address Overweight and Obesity***.[112] It outlines the prevalence of overweight and obesity in North Carolina, the preventable costs of obesity, the hunger-obesity paradox, and the role of the Social Determinants of Health. It outlines eight core behaviors that, if addressed at the individual, interpersonal, institutional, community, public policy, and environmental levels, would reduce overweight and obesity. Note these same behaviors prevent diabetes.

- Move more
- Eat more healthy food, less junk and fast food
- Eat more fruits and vegetables
- Drink more water. Drink fewer sugar sweetened beverages
- Sit less
- Start and continue to breastfeed
- Get enough sleep
- Manage stress

Table 4: Activities for Community Groups (Faith, Non-Faith, Non-Profit, Local Government, Media)

Diabetes Primary Prevention

To help manage weight and/or follow healthy eating guidelines

1. Offer free or low-cost community classes on eating healthy on a budget.
2. Ask local employers to work with food vendors who source locally.
3. Incorporate programs such as a community garden to help bring fresh foods into communities, classrooms or lunchrooms.
4. Offer DPP programs through student health at community colleges and universities, or as family classes in primary and secondary schools.
5. Regulate portion sizes.
6. Reformulate foods.
7. Encourage the availability of healthful food in public spaces, all schools and universities, community colleges and colleges, and at public events (fairs, food truck rallies).
8. Restrict the availability of unhealthy foods in public spaces, such as vending machines.
9. Tax unhealthful foods and subsidize nutritious foods.
10. Incentivize the building of supermarkets in low-income food deserts.
11. Increase participation in federal, state and local government food and nutrition programs (WIC, SNAP, CACFP), etc.
12. Engage at the local and state government levels to develop and implement policies, programs and activities designed to improve the health of North Carolinians and reduce the burden of diabetes.
13. Refer people to evidence-based weight loss programs including those offered through diabetes prevention programs, or North Carolina's **Eat Smart, Move More, Weigh Less** or a registered dietitian nutritionist for weight management.

Diabetes Prevention for People at High Risk

To help manage weight and/or participate in regular physical activity at the community level and to sustain those completing diabetes prevention programs

1. Establish and promote walking and cycling clubs.
2. Partner with existing health and fitness facilities (e.g. YMCA, gyms, etc.).
3. Collaborate with local Cardio/Pulmonary Rehabilitation programs.

To help participation in diabetes prevention education programs

1. Collect and disseminate information about local Diabetes Self-Management Education and Support (DSMES) services.
2. Partner with a sponsoring agency such as a local health department to offer diabetes prevention programs in your congregation or community center.
3. Build partnerships with local health departments and hospitals to sponsor health fairs, with diabetes risk screening and medical follow-up for those at high risk for prediabetes, and referrals to DPP.
4. Work with health care providers or state agencies to train Community Health Workers to screen for diabetes within communities and refer to appropriate care.
5. Promote awareness of prediabetes on national point days like Diabetes Alert Day, International Diabetes Day and Diabetes Awareness Month.
6. Partner with local public health safety net providers to offer tips for people at risk for diabetes on national point days like World Diabetes Day, Diabetes Alert Day and Diabetes Awareness Month.

Diabetes Management and Prevention of Complications

To help participation in individual and/or group self-management education programs

1. Partner with a sponsoring agency to become an expansion site to deliver Diabetes Self-Management Education and Support services.
2. Offer support groups for people who have diabetes and their caregivers.
3. Partner with hospitals to offer diabetes education to reduce hospital readmissions.
4. Partner with faith-based nursing/health groups throughout the state to offer further services within their congregations.
5. Encourage peer support programs. This may include offering of space to hold support groups, including time for peer support in community DSMES services.

To help persist with personalized diabetes treatment plans

1. Raise funds for Safety Net Providers to help them offset the cost of medications and supplies for people with diabetes.
2. Promote proper diabetes care through use of posters, bulletin inserts, and sermons.
3. Create and support peer education programs targeting geographic gaps in available accredited programs.

To help manage weight and/or participate in regular physical activity

1. Advocate for walkable communities, including sidewalks, green spaces, walking trails.
2. Advocate for outdoor lighting for tracks and other recreational areas.
3. Promote comprehensive physical activity programs in schools and after school programs.
4. Offer free group physical activity in public parks.
5. Develop and implement land use and neighborhood design policies to support active lifestyles.
6. Promote worksite policies that encourage physical activity.
7. Allow shared and/or open use of facilities (e.g., school tracks).
8. Refer people to **Eat Smart, Move More, NC** for strategies to manage weight or participate in regular physical activity.

To help live tobacco free

1. Increase the tax on tobacco products
2. Limit the use of tobacco products in public spaces.
3. Educate about the dangers of Vaping.
4. Advocate for alternate tobacco advertising.

To promote adequate sleep

1. Promote sleep health for individuals.
2. Set expectations for minimal rest/sleep intervals for workers, especially those who make critical decisions (e.g. health care workers, transportation workers).
3. Identify additional resources to promote adequate sleep, such as those found in **Eat Smart, Move More, NC.**

Other Opportunities for Local Governments[113]

Consider this partial list of opportunities that your local government might do to encourage the prevention of diabetes though the encouragement of healthy body weight and adequate physical activity:

- Create complete streets and sidewalks.
- Support active transportation (walking, biking, transit).
- Develop shared and/or open use agreements so schools, libraries, and other sites can become places for community physical activity.
- Subsidize park, recreation, and fitness center memberships.
- Promote community gardens/urban agriculture.
- Encourage local stores to stock healthy foods.
- Develop licensing restrictions to reduce “food swamps.”
- Use menu/calorie labeling/appropriate portion sizes.
- Promote/support breastfeeding.
- Adopt healthy worksite policies.
- Pass a soda/sugar sweetened beverage tax.
- Offer on-site wellness programming (physical activity, nutrition, DPP) with focus on sites with at risk populations (police officers, firefighters, streets and sanitation workers, essential personnel).
- Support state Medicaid coverage for obesity treatment, National DPP, or DSMES.
- Double up food bucks for buying fruits and vegetables with SNAP at Farmers Markets.
- Provide universal health care and mental health care.
- Offer paid family leave.
- Be a leader in policy change that allows RNs and Pharmacists to be reimbursed for providing DSMES for people who have Medicaid or private insurance in North Carolina.
- Be a leader in policy change and permanently make changes to Telehealth delivery and reimbursement of diabetes services that were approved during the COVID-19 public health emergency for Medicaid and private insurers in North Carolina.

What Can Health Care Providers and Insurers Do?

Diabetes prevention and management is a joint responsibility between a person with or at risk for diabetes and their health care team. While the person manages their health, the person must have a health care team that is familiar with current screening and management guidelines.

Health Care Providers

Health care providers encompass a broad range of professionals with general and specialized expertise in diabetes and its complications. This includes physicians, physician assistants, advanced practice nurses, pharmacists, podiatrists, ophthalmologists, optometrists, dentists, audiologists, registered dietitian nutritionists, nurses, diabetes care and education specialists, behavioral health and mental health providers, among others. These providers play a crucial role in counseling individuals at risk for diabetes on strategies to prevent or delay the onset of the disease and its complications. They also diagnose diabetes and collaborate with patients to manage their condition through lifestyle and behavioral changes, medication, and other therapies.

Moreover, health care providers are uniquely positioned to refer individuals with diabetes to recognized Diabetes Self-Management Education and Support (DSMES) services. While the term "health care provider" is often associated with physicians, physician assistants, and advanced practice nurses, many other professionals are essential to diabetes care. This includes case managers, care coordinators, physical and occupational therapists, trainers, and exercise physiologists. Additionally, community pharmacists and community health workers have developed unique and valuable roles in supporting individuals with diabetes.

Community Pharmacists play a unique and vital role in the care of people with diabetes. With greater accessibility and frequent interactions, they often see patients more regularly than other health care providers, fostering strong collaborative relationships. Community pharmacists are instrumental in managing medication therapy, providing crucial safety checks for medications prescribed by multiple providers, and offering guidance on over-the-counter treatments. They also serve as valuable resources for information on available and affordable therapies for diabetes management.

Increasingly, community pharmacists are incorporating Diabetes Self-Management Education and Support (DSMES) services into their practices. The involvement of pharmacists in DSMES programs has led to significant improvements in medication adherence and persistence among participants, further enhancing the overall management of diabetes.[114,115]

Community Health Care Workers (CHWs) are typically lay health care workers who provide vital assistance to people with diabetes, their families, and the broader community through education and support services. Working within their own communities, CHWs share linguistic, cultural, economic, and social characteristics with those they serve, which fosters trust and respect. This connection enables CHWs to build strong relationships and serve as essential links between the community and the health care system.[116]

CHWs provide support, education, and resources related to health crises, prevention, ongoing care, and transitions of care. Their role is crucial in improving the overall health of underserved communities, reducing health disparities, and advancing health equity. Research has shown that individuals who receive interventions from CHWs experience better glycemic and lipid management, along with reduced health care utilization.[117] Moreover, economic evidence suggests that CHW interventions are cost-effective.[118]

Recognizing the value of CHWs, health care teams are increasingly incorporating them as integral members of diabetes care teams. The Community Preventive Services Task Force (CPSTF) initiated interventions in 2017 that engaged CHWs to help patients manage their diabetes. These interventions demonstrated improvements in patients' glucose and lipid management, as well as reductions in health care usage. The interventions included education, support, and coaching on glucose monitoring, medication adherence, healthy nutrition, physical activity, and weight management.

For further information, the **NC Community Health Worker Initiative** provides valuable resources. If your community does not have a CHW, the Centers for Disease Control and Prevention (CDC) offers a **CHW Toolkit** to help establish such programs

Challenges Faced by Health Care Providers

North Carolina has made significant progress in expanding the availability of health care providers across its diverse geography and communities. Nationally recognized programs such as Area Health Education Centers (AHEC), the state health department, and federally qualified health centers, along with the state's commitment to professional health education through its esteemed institutions, have all played crucial roles. Additionally, the focus on developing physician assistants and advanced practice nurses has enhanced the quality of health care available to diverse populations.

Despite these advancements, challenges remain. Underserved communities and disparities continue to be significant issues, as detailed in the section on Social Determinants of Health and Health Equity (p. 26). Health care providers also face obstacles related to adequate reimbursement for services and the need for ongoing education to keep pace with new technologies, including telehealth. Furthermore, the rapid pace of clinical developments necessitates quicker adaptation to new, proven therapeutic advances.

Therapeutic Inertia: Despite advancements in technologies and therapies, nearly half of all people with diabetes in the United States continue to have blood sugar levels that exceed target goals.[119] Therapeutic inertia—defined as the delay or failure to set appropriate treatment targets and progress treatments to achieve desired outcomes—remains a significant barrier to effective diabetes management. This issue can hinder the adoption of new, proven advances in diabetes care, including monitoring techniques, medications, and delivery methods.

To address therapeutic inertia, health care providers need to stay updated with the latest therapeutic options and emerging evidence about their effectiveness. Collaborative approaches, such as team-based care models, can be effective in overcoming this barrier.[120]

Table 5: Understanding and Overcoming Therapeutic Inertia[121]

Did you know?	How health care providers and insurers can overcome therapeutic inertia:
In the last 20 years despite more technology, more education and more drug therapies the average A1C for a person with diabetes has not changed. The number of people with an A1C over 9% has actually increased.	Refer your first patient (or additional people) with prediabetes to a DPP program.
Treatment intensification is significantly behind recommendations.	Stay up to date on emerging effective strategies—read and attend professional continuous education opportunities.
Only 5% of people recently diagnosed with diabetes on Medicare are using DSMES services.	Consider being an early adopter for new therapies that interest you or those you treat and gain experience sooner than later to share with those you treat.
There is a significant gap in what people say they are willing to do and what physicians believe people are willing to do to reduce A1C.	Get involved in community, professional and other organizations whose mission is to reduce the burden of diabetes.
Within one year of a diagnosis of diabetes, less than 50% of people are still taking the prescribed medication.	Partner with a Diabetes Care and Education Specialist to help bring emerging and effective therapies and technology into your practice or to those you treat.

Health Care Insurers ("Payers") also have multiple roles to play including:

For their insured members:

- Reimbursing individuals with diabetes or their health care providers for covered services such as direct primary and specialty care, medications, equipment, and Diabetes Prevention Programs
- Establishing their own plan specific policy for what are and are not covered services

Participation with government, employers and advocacy groups:

- More broadly shaping reimbursement policy for what are covered services across North Carolina

Over the past decade in North Carolina, insured individuals have seen expanded coverage for services, including insulin, medications, glucometers, testing supplies, vaccines, and participation in diabetes prevention programs, particularly for those at high risk. However, this coverage remains incomplete and is not universally available.

Recently several reimbursement issues driving policy deliberations in the state for broader coverage include:

- Universal reimbursement of Diabetes Prevention Programs
- Managed Medicaid
- Telehealth technology reimbursement
- Group medical or clinical visits
- Better reimbursement and coverage for DSMES and diabetes supplies, hearing aids, orthotics, reimbursement for pharmacists for DSMES

Need for better reimbursement for telehealth services not only in rural areas with reduced health care access has been particularly emphasized across the state—urban, suburban and rural—due to the COVID-19 pandemic. Telehealth can provide a wide range of clinical and educational services including indirect care and diabetes prevention.

Additional ways health care insurers and providers can work together around policy change are included in Table 6.

Table 6: Activities for Health Care Providers and Insurers

Diabetes Primary Prevention

To help manage weight and/or participate in regular physical activity

1. Advocate for walkable communities.
2. Refer people to evidence-based weight loss programs including those offered through diabetes prevention programs, or North Carolina's **Eat Smart, Move More, Weigh Less** or a registered dietitian nutritionist for weight management.
3. Engage barbers and hair stylists as community ambassadors of diabetes prevention and management, supported by community grants, partnerships with insurers and health care system, community health workers.[122]

To help live tobacco free

1. Refer people to the **Quitline.**
2. Support programs like **Live Vape Free** to help educate on the dangers of vaping.

To promote adequate sleep

1. Ask people about the quantity and quality of their sleep and advise accordingly (i.e. sleep studies to diagnose sleep apnea).

Diabetes Prevention for People at High Risk

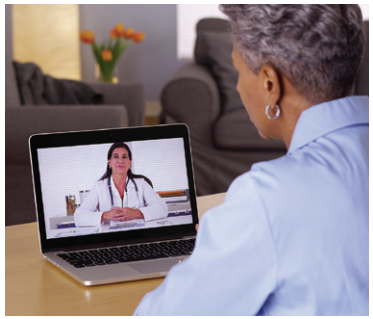
To help participation in diabetes prevention programs

1. Refer people to diabetes prevention programs and build the referral into the electronic health record (may require A1C level with definite glucose metrics required).
2. Train community resource providers of diabetes prevention programs on how to provide feedback on program participation to health care providers.

Diabetes Management and Prevention of Complications

To help participation in individual and/or group Diabetes Self-Management Education and Support (DSMES) services

1. Establish a professional relationship with hospital transition coordinators to ensure knowledge of local DSMES services and develop integration of these services into discharge paperwork.
2. Partner with a sponsoring agency to become an expansion site to deliver DSMES services, either in person or via telemedicine.
3. Refer people with diabetes to recognized DSMES services and build the referrals into the electronic health record.
4. Consider the incorporation of a Diabetes Care and Education Specialist in the primary care office without the addition of a copay or separate visit for the person with diabetes.
5. Partner with local DSMES service providers, such as local pharmacies, podiatrists, ophthalmologists/optometrists, dentists, and audiologists.[123]
6. Ensure that DPP and DSMES are covered benefits for all and waive co-pays/out of pocket deductibles.
7. Partner with CHWs in the communities to provide support, ongoing education, resources, and a link between providers and persons with prediabetes or diabetes.



To help with monitoring diabetes treatment for individual and population health

1. Develop standing orders for screening for diabetes.
2. Follow the United States Preventive Services Task Force screening recommendations and build it into the practice electronic health record.
3. Use plain language in communication with people with diabetes about diagnosis and plan of care. Consider health literacy and numeracy needs.
4. Follow clinical guidelines for diabetes care.
5. Encourage clinical decision support systems.
6. Work with Area Health Education Centers to improve continuing education about diabetes care.
7. Work with pharmacists to ensure that patients are taking the least expensive drugs that are appropriate for their condition, as well as simplification of medication plans to help reduce medication (pill) burden.
8. Follow clinical guidelines for post-partum screening of women who have had gestational diabetes.
9. Consider participating in the American Medical Group Association's Together 2 Goal program to ensure best practices.
10. Incorporate the use of technology in individualized treatment plans, including remote monitoring and real-time or flash continuous glucose monitoring.
11. Support the use of reimbursement of Telehealth for virtual clinical care and education.

What Can Employers Do?

Each year, the costs associated with diabetes, its complications, and related comorbidities continue to rise, imposing a significant financial burden. Beyond the profound impact on individuals and families, diabetes also affects the workplace. On average, individuals with diabetes incur medical expenses that are more than twice as high as those without the condition. In 2022, the economic burden of diabetes in the United States was estimated at $412.9 billion, including over $306 billion in direct medical costs and nearly $106 billion in indirect costs.[40]

Employers are uniquely positioned to address diabetes through prevention, management education, and support for employees with or at risk for diabetes. Given that employees spend a substantial portion of their lives at work, they are more likely to engage in health and nutrition education, as well as physical activity programs offered in the workplace. By partnering with employees to manage diabetes, employers can improve productivity, reduce health-related costs, and enhance both physical and mental well-being.

Employers of all sizes should collaborate with local and state agencies to support not only their own workforce but also the broader community. Engaging in diabetes prevention and management efforts across North Carolina can help reduce the risk of developing diabetes and provide support for those already living with the condition.

Table 7: Activities for Employers

Diabetes Primary Prevention	Diabetes Prevention for People at High Risk	Diabetes Management and Prevention of Complications
To help manage weight and/or follow healthy eating guidelines 1. Post full nutrition information in cafeterias. 2. Offer healthful options within cafeterias and vending machines. 3. Establish regular Farmer's Markets at the worksite. 4. Provide educational/skill classes for healthy meal preparation. 5. Offer the benefit of employee participation in virtual or in-person Diabetes Prevention Programs through their health insurance programs. **To help manage weight and/or participate in regular physical activity** 1. Subsidize gym memberships. 2. Offer fitness centers or walking tracks on company property. 3. Sponsor weight loss programs which include a prize related to health such as the purchase of activity trackers.	**To help participation in diabetes prevention education programs/CDC recognized lifestyle change programs** 1. Offer the benefit of employee participation in virtual or in-person Diabetes Prevention Programs through their health insurance programs. 2. Partner with a diabetes prevention program to offer classes at work. 3. Create direct referral links between worksites and DSMES services. 4. Offer on-site screening to identify employees with undiagnosed diabetes, prediabetes, and other risk factors. 5. Provide incentives for milestone and/or completing the program.	**To help participation in individual and/ or group self-management education programs** 1. Partner with health care providers, local public health, and community agencies to offer recognized Diabetes Self-Management Education and Support (DSMES) services at work. 2. Partner with local specialists for pharmacy, podiatry, optometry, dental, and audiology (PPOD+A) care. **To help persistence with personalized diabetes treatment plans** 3. Allow employees time off for diabetes screening and/or medical appointments without penalty. 4. Offer wellness programs to assist in diabetes management. These may include programs to: a. Offer coverage of insulin at the minimal co-pay/ month.

4. Promote stair climbing and walking at lunch.
5. Offer weight management programs as a covered benefit.
6. Offer the benefit of employee participation in virtual or in-person Diabetes Prevention Programs through their health insurance programs.

To help live tobacco free

1. Connect with Quitline and smoking cessation opportunities.
2. Offer insurance subsidies for non-smokers.

To promote adequate sleep

1. Establish at least 10 consecutive hours per day of protected time off-duty to allow workers to obtain no fewer than seven to eight hours of sleep.
2. Permit frequent brief rest breaks (e.g., every one to two hours) during mentally and physically demanding work, which are more effective against fatigue than a few longer breaks. Allow longer breaks for meals.
3. Schedule five eight-hour shifts or four 10-hour shifts per week, which are usually acceptable. Depending on the workload, 12-hour day shifts may be tolerated when interspersed with days off. During the evening and night, shorter shifts (e.g., eight hours) are better tolerated than longer shifts.
4. Examine work demands with respect to shift length. Twelve-hour shifts are more acceptable for "lighter" tasks (e.g., desk work).
5. Plan one to two full days of rest following five consecutive eight-hour shifts or four consecutive 10-hour shifts. Consider two rest days after three consecutive 12-hour shifts.
6. Provide training to inform workers of the challenges linked to shift work and long work hours and what resources are available to them to help with any difficulty they are having with their work schedule.
7. Examine close calls and incidents to determine the role, if any, of fatigue as a root cause or contributing cause to the incident.

b. Offset the cost of medications for individuals.
c. Offer premium reductions for people who maintain an A1C at their individualized goal.
d. Offset costs of testing supplies and medications to assist in higher levels of self-management.

5. Offer health screenings at work, particularly on diabetes point days (e.g., Diabetes Alert Day, National Diabetes Month) including screenings for complications (eye, hearing, feet).
6. Cover insulin pumps as a co-pay instead of as durable medical equipment.
7. Offer refrigerators at work for insulin storage.
8. Ensure that your benefits package allows for similar co-pays on insulin pens and insulin vials.
9. Cover continuous glucose monitors for all people with diabetes, regardless of type of diabetes, as a co-pay instead of as durable medical equipment.
10. Avoid the use of restricted formularies as these tend to highly limit the medications available to people and tie the hands of health care professionals as to what may work best for the people being treated.

What Else Can North Carolinians Do Together?

Given the enormity of the diabetes epidemic and the number of people at high risk of developing diabetes, approaches aimed exclusively at individual behavior change are inadequate. Improvements in policy and environmental factors that enable and reinforce healthy eating and active lifestyles are needed for widespread and sustained behavior change and overall impact.[124]

All stakeholders highlighted in this Guide have a role in the coordination of advocacy, formulating, and implementing policies that benefit our society. The State of North Carolina has a special responsibility leveraging these efforts. Here we will call out just a few examples of what North Carolinians can do to reduce the burden of diabetes in our state.

- Living Tobacco Free
- Improving Nutrition and Reducing Obesity
- Improved health coverage for all
- Offer health screenings at work, particularly on diabetes point days (e.g., Diabetes Alert Day, National Diabetes Month) including screenings for complications (eye, hearing, feet)
- Cover continuous glucose monitors for all people with diabetes, regardless of type of diabetes, as a co-pay instead of as durable medical equipment

Living Tobacco Free

People who smoke are 30% to 40% more likely to get type 2 diabetes than people who don't smoke. The more you smoke, the higher your risk; and smokers with diabetes are more likely to have serious health problems.[125]

Living tobacco free is a key public health strategy to prevent and manage the epidemic of diabetes. It is extremely important for people to stop smoking, but prevention is critical, and a multi-component approach is required to prevent people from starting to use tobacco in the first place. According to the **Surgeon General's report on Smoking and Tobacco**, nearly all tobacco use begins during youth and young adulthood. Policies and programs that make tobacco use more difficult and less accepted can help prevent young people from using tobacco.

Policies that change the environment to support and encourage a tobacco-free life (cigarette smoking, vaping, and chewing) are very effective in smoking prevention. For instance, making tobacco products less affordable, restricting tobacco marketing, banning smoking in public places and requiring labeling on tobacco packages are some policies that have been successful in deterring youth from starting tobacco use.[125] Additionally, mass reach health communication interventions, primarily television broadcasts, have proven effective to reduce initiation among young people.

The most effective strategies to prevent tobacco use should combine elements such as use of evidence-based curricula and policy changes implemented in a variety of settings such as work, home, school, health care, and in public places. Smoking cessation can be one of the most effective lifestyle interventions in limiting the burden of diabetes. Studies have reported that smoking cessation reduces the risk for diabetes to the level of non-smokers after five years of cessation for women and 10 years for men. Smoking cessation improves blood sugar management by increasing insulin reception and reducing the risk of diabetes-related complications.[126] The following strategies have proven effective to help smokers quit:

- Advice and assistance on quitting provided by a health care provider.
- Individual, group or telephone counseling.
- Behavioral therapies.
- Treatment with more one-on-one contact and more intensity.
- Programs that deliver treatments using mobile phones.
- Medications: over-the counter and prescription.

Secondhand smoke, also known as passive smoking, is the inhalation of tobacco smoke by those other than the actual (active) smoker. It is linked to many of the same diseases as smoking including lung cancer, respiratory disease and cardiovascular disease. Studies have reported that the incidence of type 2 diabetes increases with exposure to secondhand smoke during childhood and adulthood.[127] Smoking bans and increased smoke-free environments may prove to be an important approach in reducing the incidence of type 2 diabetes. Policies that prohibit smoking indoors reduce exposure to secondhand smoke, reduce the number of cigarettes smoked each day and increase the number of smokers who quit.

Improving Nutrition and Reducing Overweight and Obesity

North Carolina has a plan to address overweight and obesity by advocating how we balance how we eat, drink and move called ***North Carolina's Plan to Address Overweight and Obesity***.[112] It outlines eight core behaviors, including those at the public policy and environmental levels that would reduce overweight and obesity: move more; eat more healthy food, less junk and fast food; eat more fruits and vegetables; drink more water, drink fewer sugar sweetened beverages; sit less; start and continue to breastfeed; get enough sleep; and manage stress.

Improved Health Coverage for All

North Carolina expanded who can get Medicaid on December 1, 2023, making more than 600,000 North Carolinians age 19 through 64, with incomes up to 138% of the Federal Poverty Level, eligible to receive benefits. Expansion was implemented in conjunction with other major delivery system reforms and activities to address social determinants of health and reduce disparities. Medicaid health coverage is comprehensive and reduces barriers for people with chronic diseases like diabetes. It includes doctor visits, check-ups, emergency care, hospital services, maternity and postpartum care, vision and hearing services, prescription drugs, behavioral health, preventive and wellness services, dental care, medical-related devices and more. There is no monthly fee and copays are never more than $4. Medicaid expansion has been shown to improve access to care, treatment and outcomes for cancer, chronic conditions, sexual and reproductive health, and behavioral health. Studies also point to evidence of reduced racial disparities in coverage and access, reduced mortality, and improvements in economic impacts for providers (particularly rural hospitals) and economic stability for individuals.[128]

North Carolina has already seen an increase in access to care and medications, especially in rural areas.

We Will Be Successful When We Reach Our Goals

Accomplishing the following overarching goals will reduce the burden of diabetes in our state:

- Support efforts to find a cure for diabetes
- Lower the risk of pregnant women developing gestational diabetes so they and their babies can live healthy lives
- Increase efforts to reduce the incidence and prevalence of diabetes, including supporting the development and implementation of DPP programs across the state
- Decrease the rate of deaths directly and indirectly associated with diabetes
- Increase access to health care and personal care resources to reduce the risk of diabetes-related complications, particularly through DSMES programs
- Ensure that community stakeholders of all types are engaged and take action to create environments that support diabetes prevention as well as adequate education and care for those with diabetes including supporting behaviors that promote
  - Healthy weight
  - Healthy eating
  - Regular physical activity
  - Tobacco free
  - Adequate sleep

While there are a number of measures used to indicate changes in the burden of diabetes in North Carolina and monitor our progress toward our goals, collecting baseline and periodic outcome data consistently presents a number of challenges and will have to be left up to others.

We may however be able to assess the impact of this guide by documenting and measuring

- Presentations about and distributions of the guide at state conferences (e.g., NC Public Health Association, NC Primary Care Conference, NC Chronic Disease Conference, NC American Indian Unity Conference) and to state policymakers
- Distribution of print versions of the guide to stakeholders, particularly to those who work with populations at high risk for diabetes and its complications
- Number of times electronic versions of the guide are accessed via the NC DAC website and social media page
- Results of efforts of NC DAC members to advocate for guide implementation
- Communication and feedback on a regular basis at NC DAC meetings to ensure the guide is being effectively implemented

We will also know we are being successful in our goal of reducing the burden of diabetes when:

- People at risk for diabetes change behaviors enough to prevent progression of prediabetes to diabetes
- Everyone uses person-centric, affirmative, enabling, non-judgmental language when dealing with diabetes
- We prevent complications of all types, for those with diabetes, especially
  - Heart disease
  - Stroke
  - Kidney disease, including dialysis
  - Blindness
  - Amputation
  - Hearing loss
  - Risk of falls
- Everyone concerned about diabetes has access and affordability to
  - Medical treatment
  - Medications including insulin
  - Education
  - Diabetes Technology
- Community stakeholders of all types are engaged and take action to create environments that support diabetes prevention as well as adequate education and care for those with diabetes including supporting healthy behaviors that promote
  - Healthy weight
  - Healthy eating
  - Regular physical activity
  - Tobacco free
  - Adequate sleep

How This Guide Was Developed

NC Diabetes Advisory Council

The **North Carolina Diabetes Advisory Council** (DAC) was created in 1988 as an advisory group to the NCDHHS Division of Public Health. When the DAC was established, there were over 300 different sets of standardized clinical guidelines for diabetes management. In 1996, the American Diabetes Association published its first supplement, which organized all current standards and clinical recommendations for diabetes care and management, position and consensus statements, as well as the National Standards for DSME, into one issue of *Diabetes Care*, called a Supplement,132 which is published in January. The DAC received these and developed a uniform set of patient and provider clinical guidelines that were dispersed throughout the state. The DAC worked with the Division of Public Health staff to create a diabetes self-management education curriculum prior to development of formal education curricula by either the American Association of Diabetes Educators, now Association of Diabetes Care and Education Specialist or the American Diabetes Association.

DAC
North Carolina Diabetes Advisory Council

The DAC was vital in ensuring that North Carolina enacted legislation requiring insurance companies to cover diabetes medication, supplies and education. Thanks to the work of the DAC and legislators, North Carolina was one of the first states to pass legislation to protect schoolchildren with diabetes. The DAC serves as a professional resource for the NCDHHS' Division of Public Health. The membership is comprised of health professionals, providers, community and business leaders, people with diabetes, advocacy groups, coalitions, stakeholders, partners, etc., who are all committed to reducing the burden of diabetes in North Carolina. The council for the group is led by a chair and vice chair who represent both the clinical, research, and community aspects of diabetes prevention and management. It is staffed by a coordinator who works for the Division of Public Health. The group meets in person (or virtually depending on limitations) three times a year, and the chair, vice-chair and coordinator meet monthly to plan activities and carry out assignments. The by-laws also allow for ad-hoc committee meetings as needed. The three annual DAC council meetings include topics relevant to diabetes prevention and management information outlined in this Guide.

Guide Development Process

North Carolina's Guide to Prevention and Management of Diabetes, Third Edition was developed to build on the successful creation of the 2020 and the *2015–2020 Guide*. The previous versions were influenced by the *NC Diabetes Strategic Plan* (2011–2012), the *NC Coordinated Chronic Disease and Injury Prevention State Plan* (2013), and the *NC Legislative Diabetes Action Plan* (2015), and through collaborations with representatives from the Center for Health Law and Policy Innovation at the Harvard Law School Public Policy Innovation Center, Kate B. Reynolds Charitable Trust, and Centers for Disease Control and Prevention.

This Third Edition has been edited to include the latest data and evidence-based practices related to improving health disparities/health equity and social determinants of health. The evidence remains compelling that social determinants are a major driving force behind the rise and racial/ethnic disparities in diabetes in our state and across the country. The team also felt it was important to incorporate information on select medications available for the treatment and management of diabetes. The *Guide* is aligned with other statewide guides with missions like the NC DAC, including those developed by Eat Smart Move More NC and the Justus-Warren Heart Disease and Stroke Prevention Task Force.

For the Third Edition of the *Guide*, members of the NC DAC Abstract Committee along with **Chris Memering**, MSN, RN, CDCES,FADCES, NC DAC Chair and **Joanne Rinker**, MS, RD, CDCES, LDN, FADCES NC DAC Vice Chair developed the process for updates and the focus of revisions to the document. The team was supported in their efforts by **Claudia Giraldo**, MPH and **Corissa Payton**, MA, CHES, ACSM-EP of the Community and Clinical Connections for Prevention and Health Branch, North Carolina Department of Health and Human Services.

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Beginning in spring 2024, members of the NC DAC Abstract Committee participated in a series of virtual meetings led by the support team to discuss the research and policies for content inclusion. Each member was assigned sections based on their expertise of the *2020 Guide*, with the assignment to ensure that the most recent evidence base was used to inform the structure and content of the Third Edition.

After several additional rounds of revisions from the members of the writing team, external reviewers provided feedback, which was incorporated into the *Guide* by lead support staff and final reviewers. Reviewers included (in alphabetical order)

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The Third Edition of the *Guide* was finalized in November 2024. The *Guide* will be available on the **Diabetes North Carolina** website.

Appendix: Websites for Diabetes Prevention and Management

These websites are provided for those who want to prevent and manage diabetes. This list is not comprehensive.

Association of Diabetes Care & Education Specialists
diabeteseducator.org

American Diabetes Association
diabetes.org

CDC Diabetes
cdc.gov/diabetes

CDC Diabetes Prevention Recognition Program
cdc.gov/diabetes-prevention/lifestyle-change-program

Diabetes at Work
diabetes.org/advocacy/know-your-rights/your-rights-on-the-job

Diabetes Patient Advocacy Coalition
diabetespac.org

Diabetes Sisters
diabetessisters.org

Juvenile Diabetes Research Foundation
jdrf.org

National Diabetes Education Program
ndep.nih.gov

National Diabetes Prevention Program
cdc.gov/diabetes-prevention

National Institute of Diabetes and Digestive and Kidney Diseases
niddk.nih.gov

NCDHHS – Division of Public Health
diabetesnc.com
diabetesfreennc.com
diabetesmanagementnc.com

Partnerships for Prescription Assistance
pparx.org

Taking Control of Your Diabetes (TCOYD)
tcoyd.org

References

1. Explore diabetes in North Carolina | AHR. America's Health Rankings. Published 2022. Accessed April 21, 2024. https://www.americashealthrankings.org/explore/measures/Diabetes/NC

2. The burden of diabetes in North Carolina. American Diabetes Association. Published March 2023. Accessed April 21, 2024. https://diabetes.org/sites/default/files/2023-09/ADV_2023_State_Fact_sheets_all_rev_North_Carolina.pdf

3. Centers for Disease Control and Prevention. Stats of the states–diabetes mortality. CDC.gov. Published April 29, 2022. Accessed April 21, 2024. https://www.cdc.gov/nchs/pressroom/sosmap/diabetes_mortality/diabetes.htm

4. Agency For Toxic Substances and Disease Registry. Models and frameworks for the practice of community engagement. CDC.gov. Published June 25, 2015. Accessed April 21, 2024. https://www.atsdr.cdc.gov/communityengagement/pce_models.html

5. Golden SD, McLeroy KR, Green LW, Earp JAL, Lieberman LD. Upending the Social Ecological Model to guide health promotion efforts toward policy and environmental change. *Health Education & Behavior*. 2015;42(1_suppl):8S14S. doi:https://doi.org/10.1177/1090198115575098

6. Dickinson JK, Guzman SJ, Maryniuk MD, et al. The use of language in diabetes care and education. *Diabetes Care*. 2017;40(12):1790-1799. doi:https://doi.org/10.2337/dci17-0041

7. American Diabetes Association. Understanding diabetes diagnosis. diabetes.org. Published 2023. Accessed April 21, 2024. https://diabetes.org/about-diabetes/diagnosis

8. CDC. The surprising truth about prediabetes. Diabetes. Published May 21, 2024. Accessed April 21, 2024. https://www.cdc.gov/diabetes/prevention-type-2/truth-about-prediabetes.html#:~:text=Prediabetes%20is%20a%20big%20deal

9. CDC. National diabetes statistics report. Diabetes. Published May 15, 2024. Accessed August 31, 2024. https://www.cdc.gov/diabetes/php/data-research/index.html

10. Boyko EJ, Seelig AD, Ahroni JH. Limb- and person-level risk factors for lower-limb amputation in the prospective Seattle diabetic foot study. *Diabetes Care*. 2018;41(4):891-898. doi:https://doi.org/10.2337/dc17-2210

11. Lawal Y, Bello F, Kaoje YS. Prediabetes deserves more attention: A review. *Clinical Diabetes*. 2020;38(4):cd190101. doi:https://doi.org/10.2337/cd19-0101

12. Deshpande AD, Harris-Hayes M, Schootman M. Epidemiology of diabetes and diabetes-related complications. *Physical Therapy*. 2018;88(11):1254-1264. Accessed April 21, 2024. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3870323/

13. Giovannucci E, Harlan DM, Archer MC, et al. Diabetes and cancer: A consensus report. *Diabetes Care*. 2010;33(7):1674-1685. doi:https://doi.org/10.2337/dc10-0666

14. American Diabetes Association. Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes—2022. *Diabetes Care*. 2022;45(Supplement_1):S17-S38. doi:https://doi.org/10.2337/dc22-s002

15. American Diabetes Association. Statistics about diabetes. diabetes.org. Published 2023. Accessed April 23, 2024. https://diabetes.org/about-diabetes/statistics/about-diabetes

16. Herold KC, Bundy BN, Long SA, et al. An Anti-CD3 Antibody, Teplizumab, in relatives at risk for type 1 diabetes. *New England Journal of Medicine*. 2019;381(7):603-613. doi:https://doi.org/10.1056/nejmoa1902226

17. CDC. QuickStats: Percentage of mothers with gestational diabetes, by maternal age — national vital statistics system, United States, 2016 and 2021. *MMWR Morbidity and Mortality Weekly Report*. 2023;72(1). doi:https://doi.org/10.15585/mmwr.mm7201a4

18. U.S. Department of Health and Human Services. Diabetes and Pregnancy Gestational Diabetes. Centers for Disease Control and Prevention. Accessed August 31, 2024. https://www.cdc.gov/pregnancy/documents/shared-bd/Diabetes_and_Pregnancy508.pdf

19. ElSayed NA, Grazia Aleppo, Bannuru RR, et al. 15. Management of Diabetes in Pregnancy: *Standards of Care in Diabetes—2024. Diabetes Care*. 2023;47(Supplement_1):S282-S294. doi:https://doi.org/10.2337/dc24-s015

20. D'Amico R, Dalmacy D, Akinduro JA, et al. Patterns of postpartum primary care follow-up and diabetes-related care after diagnosis of gestational diabetes. *JAMA Network Open*. 2023;6(2):e2254765. doi:https://doi.org/10.1001/jamanetworkopen.2022.54765

21. CDC. About type 2 diabetes. Diabetes. Published 2024. Accessed August 23, 2024. https://www.cdc.gov/diabetes/about/about-type-2-diabetes.html

22. ElSayed NA, Grazia Aleppo, Bannuru RR, et al. 2. Diagnosis and classification of diabetes: Standards of Care in Diabetes—2024. *Diabetes Care*. 2024;47(Supplement_1):S20-S42. doi:https://doi.org/10.2337/dc24-s002

23. BRFSS 2018 - North Carolina: Survey results. Prediabetes. NC State Center for Health Statistics. Published August 16, 2019. Accessed March 26, 2024. https://schs.dph.ncdhhs.gov/data/brfss/2018/nc/all/prediab.html

24. CDC. Diabetes basics. Diabetes. Published May 16, 2024. Accessed August 23, 2024. https://www.cdc.gov/diabetes/about/index.html#:~:text=With%20prediabetes%2C%20blood%20sugar%20levels

25. CDC. Prediabetes: Could it be you? Diabetes. Published May 22, 2024. Accessed August 23, 2024. https://www.cdc.gov/diabetes/communication-resources/prediabetes-statistics.html

26. Divers J, Mayer-Davis EJ, Lawrence JM, et al. Trends in incidence of type 1 and type 2 diabetes among youths — Selected counties and Indian Reservations, United States, 2002–2015. *MMWR Morbidity and Mortality Weekly Report*. 2020;69(6):161-165. doi:https://doi.org/10.15585/mmwr.mm6906a3

27. Harding JL, Pavkov ME, Gregg EW, Burrows NR. Trends of nontraumatic lower-extremity amputation in end-stage renal disease and diabetes: United States, 2000–2015. Diabetes Care. 2019;42(8):1430-1435. doi:https://doi.org/10.2337/dc19-0296

28. BRFSS 2012 - North Carolina: Survey results. Diabetes-African Americans. NC State Center for Health Statistics. Published August 6, 2013. Accessed March 26, 2024. https://schs.dph.ncdhhs.gov/data/brfss/2012/nc/afam/DIABETE3.html

29. North Carolina resident population health data by race and ethnicity. NC State Center for Health Statistics. Published 2019. Accessed March 26, 2024. https://schs.dph.ncdhhs.gov/schs/pdf/NCPopHealthDatabyRaceEthOct2019v2.pdf

30. Leading causes of death, North Carolina residents, 2012. *NC State Center for Health Statistics*. Published online December 2013. Accessed March 26, 2024. https://schs.dph.ncdhhs.gov/data/vital/lcd/2012/pdf/TblsA-F.pdf

31. North Carolina Department of Health and Human Services, Office of Minority Health and Health Disparities. Racial and ethnic health disparities in North Carolina. Published April 2018. Accessed March 26, 2024. https://digital.ncdcr.gov/documents/detail/4910361?item=5547323

32. QuickStats: Percentage of adults aged ≥18 years with diagnosed diabetes, by urbanization level and age group — National health interview survey, United States, 2022. *MMWR Morbidity and Mortality Weekly Report*. 2024;73. doi:https://doi.org/10.15585/mmwr.mm7302a5

33. 2019 BRFSS survey results: Piedmont North Carolina diabetes. NC State Center for Health Statistics. Published September 9, 2020. Accessed March 26, 2024. https://schs.dph.ncdhhs.gov/data/brfss/2019/pied/DIABETE4.html

34. 2019 BRFSS survey results: Eastern North Carolina diabetes. NC State Center for Health Statistics. Published September 9, 2020. Accessed March 26, 2024. https://schs.dph.ncdhhs.gov/data/brfss/2019/east/DIABETE4.html

35. 2019 BRFSS survey results: Western North Carolina diabetes. NC State Center for Health Statistics. Published September 9, 2020. Accessed March 26, 2024. https://schs.dph.ncdhhs.gov/data/brfss/2021/west/DIABETE4.html

36. 2018 BRFSS survey results: Piedmont North Carolina** Chronic health conditions. NC State Center for Health Statistics. Published August 16, 2019. Accessed March 26, 2024. https://schs.dph.ncdhhs.gov/data/brfss/2018/pied/DIABETE3.html

37. Barker L, et al. Geographic distribution of diagnosed diabetes in the U.S.: a diabetes belt. American Journal of Preventive Medicine, Volume 40, Issue 4, 434 - 439. Published April 2011. Accessed March 26, 2024. doi.org/10.1016/j.amepre.2010.12.019

38. Norton JM, Moxey-Mims MM, Eggers PW, et al. Social determinants of racial disparities in CKD. *Journal of the American Society of Nephrology*. 2016;27(9):2576-2595. doi:https://doi.org/10.1681/ASN.2016010027

39. Casagrande SS, Park J, Herman WH, Bullard KM. Health insurance and diabetes. PubMed. Published December 20, 2023. Accessed March 26, 2024. https://www.ncbi.nlm.nih.gov/books/NBK597725/

40. American Diabetes Association. New American Diabetes Association report finds annual costs of diabetes to be $412.9 Billion | ADA. diabetes.org. Published November 1, 2023. Accessed March 28, 2024. https://diabetes.org/newsroom/press-releases/new-american-diabetes-association-report-finds-annual-costs-diabetes-be

41. American Diabetes Association. Economic costs of diabetes in the U.S. in 2017. Diabetes Care. 2018;41(5):917-928. doi:https://doi.org/10.2337/dci18-0007

42. Rubens M, Ramamoorthy V, Saxena A, McGranaghan P, McCormack-Granja E. Recent trends in diabetes-associated hospitalizations in the United States. *Journal of Clinical Medicine*. 2022;11(22):6636. doi:https://doi.org/10.3390/jcm11226636

43. American Diabetes Association. Diabetes care in the hospital: Standards of medical care in diabetes—2022. *Diabetes Care*. 2021;45(Supplement_1):S244-S253. doi:https://doi.org/10.2337/dc22-s016

44. Diabesity: How obesity is related to diabetes. Published online November 8, 2021. Accessed April 21, 2024. https://health.clevelandclinic.org/diabesity-the-connection-between-obesity-and-diabetes

45. American Diabetes Association. Obesity and weight management for the prevention and treatment of type 2 diabetes: Standards of Care in Diabetes-2024. Diabetes Care. Published online January 1, 2024:47(Suppl 1):S145-S157. doi:https://doi.org/10.2337/dc24-S008.

46. American Diabetes Association Professional Practice Committee. 5. Facilitating positive health behaviors and well-being to improve health outcomes: Standards of Care in Diabetes-2024. *Diabetes Care*. 2024;47(Suppl 1):S77-S110:S48-S65. doi:https://doi.org/10.2337/dc24-er04

47. Evert AB, Dennison M, Gardner CD, et al. Nutrition therapy for adults with diabetes or prediabetes: A consensus report. *Diabetes Care*. 2019;42(5):731-754. doi:https://doi.org/10.2337/dci19-0014

48. Malik VS, Hu FB. Fructose and cardiometabolic health. *Journal of the American College of Cardiology*. 2015;66(14):1615-1624. doi:https://doi.org/10.1016/j.jacc.2015.08.025

49. Horne BD, Grajower MM, Anderson JL. Limited evidence for the health effects and safety of intermittent fasting among patients with type 2 diabetes. *JAMA*. 2020;324(4):341. doi:https://doi.org/10.1001/jama.2020.3908

50. Dietary Guidelines for Americans 2020 -2025. USDA. Published 2020. Accessed April 21, 2024. https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf

51. Shan Z, Wang F, Li Y, et al. Healthy eating patterns and risk of total and cause-specific mortality. *JAMA Internal Medicine*. 2023;183(2):142-153. doi:https://doi.org/10.1001/jamainternmed.2022.6117

52. USDA. Your MyPlate Plan - 2000 calories, ages 14+. MyPlate. www.myplate.gov. Accessed April 21, 2024. https://www.myplate.gov/myplate-plan/results/2000-calories-ages-14-plus

53. Ding C, Chan Z, Magkos F. Lean, but not healthy: the "metabolically obese, normal-weight" phenotype. journals.lww.com. Published November 2016. Accessed April 21, 2024. https://journals.lww.com/co-clinicalnutrition/Abstract/2016/11000/Lean

54. CDC. Measuring physical activity intensity. *Physical Activity*. CDC. Published April 11, 2020. Accessed April 21, 2024. https://www.cdc.gov/physicalactivity/basics/measuring/index.html

55. American Diabetes Association. Weekly exercise targets. diabetes.org. Accessed April 23, 2024. https://diabetes.org/health-wellness/fitness/weekly-exercise-targets

56. Kanaley JA, Colberg SR, Corcoran MH, et al. Exercise/physical activity in individuals with type 2 diabetes: A consensus statement from the American College of Sports Medicine. *Medicine & Science in Sports & Exercise*. 2022;54(2):353-368. doi:https://doi.org/10.1249/mss.0000000000002800

57. U.S Department of Health and Human Services. The health consequences of smoking—50 years of progress. Nih.gov. Published 2014. Accessed April 23, 2024. https://www.ncbi.nlm.nih.gov/books/NBK179276/

58. Foy CG, Bell RA, Farmer DF, Goff DC, Wagenknecht LE. Smoking and incidence of diabetes among U.S. adults: Findings from the insulin resistance atherosclerosis study. *Diabetes Care*. 2005;28(10):2501-2507. doi:https://doi.org/10.2337/diacare.28.10.2501

59. D'Arrigo T. How does nicotine affect blood sugar? WebMD. Published July 7, 2023. Accessed April 23, 2024. https://www.webmd.com/diabetes/nicotine-blood-sugar

60. American Diabetes Association. Facilitating behavior change and well-being to improve health outcomes: Standards of Medical Care in Diabetes—2020. *Diabetes Care*. 2020;43(Supplement 1):S48-S65. doi:https://doi.org/10.2337/dc20-s005

61. Insaf Altun, Nursan Cınar, Dede C. The contributing factors to poor sleep experiences in according to the university students: A cross-sectional study. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences*. 2012;17(6):557. Accessed April 23, 2024. https://ncbi.nlm.nih.gov/pmc/articles/PMC3634295/

62. Tononi G, Cirelli C. Sleep function and synaptic homeostasis. *Sleep Medicine Reviews*. 2006;10(1):49-62. doi:https://doi.org/10.1016/j.smrv.2005.05.002

63. U.S. Department of Health and Human Services. National Institutes of Health. Your guide to healthy sleep. National Heart, Lung, and Blood Institute. *AMER ISBN 1-933236-04-3.*; 2011. Accessed April 23, 2024. https://www.nhlbi.nih.gov/files/docs/public/sleep/healthy_sleep.pdf

64. Vetter C, Dashti HS, Lane JM, et al. Night shift work, genetic risk, and type 2 diabetes in the UK Biobank. *Diabetes Care*. 2018;41(4):762-769. doi:https://doi.org/10.2337/dc17-1933

65. Gami AS, Olson EJ, Shen WK, et al. Obstructive sleep apnea and the risk of sudden cardiac death. *Journal of the American College of Cardiology*. 2013;62(7):610-616. doi:https://doi.org/10.1016/j.jacc.2013.04.080

66. Pippitt K, Li M, Gurgle HE. Diabetes Mellitus: Screening and diagnosis. *American Family Physician*. 2016;93(2):103-109. Accessed April 23, 2024. https://www.aafp.org/pubs/afp/issues/2016/0115/p103.html

67. Centers for Disease Control and Prevention. Diabetes risk factors. Diabetes. Published May 13, 2024. Accessed August 31, 2024. https://www.cdc.gov/diabetes/risk-factors/index.html

68. CDC. Get active. Diabetes. Published May 22, 2024. Accessed August 31, 2024. https://www.cdc.gov/diabetes/living-with/physical-activity.html

69. Wilcox G. Insulin and insulin resistance. *Clinical Biochemist Reviews*. 2005;26(2):19-39. Accessed April 23, 2024. https://ncbi.nlm.nih.gov/pmc/articles/PMC1204764/

70. Portillo-Sanchez P, Bril F, Maximos M, et al. High prevalence of nonalcoholic fatty liver disease in patients with type 2 diabetes mellitus and normal plasma aminotransferaselLevels. *The Journal of Clinical Endocrinology & Metabolism*. 2015;100(6):2231-2238. doi:https://doi.org/10.1210/jc.2015-1966

71. American Diabetes Association. Introduction: Standards of Medical Care in Diabetes—2020. *Diabetes Care*. 2020;43(Supplement 1):S1-S2. doi:https://doi.org/10.2337/dc20-sint

72. Insel RA, Dunne JL, Atkinson MA, et al. Staging presymptomatic type 1 diabetes: A scientific statement of JDRF. The Endocrine Society and the American Diabetes Association. *Diabetes Care*. 2015;38(10):1964-1974. doi:https://doi.org/10.2337/dc15-1419

73. Knowler WC, Barrett-Connor E, Fowler SE, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *The New England Journal of Medicine*. 2002;346(6):393-403. doi:https://doi.org/10.1056/NEJMoa012512

74. Diabetes prevention program coverage. Medicare.gov. Accessed August 23, 2024. https://www.medicare.gov/coverage/medicare-diabetes-prevention-program

75. American Diabetes Association, Standards of Medical Care in Diabetes. Introduction. *Diabetes Care*. 2017;40(Supplement 1):S1-S2. doi:https://doi.org/10.2337/dc17-s001

76. ElSayed NA, Grazia Aleppo, Bannuru RR, et al. 4. Comprehensive medical evaluation and assessment of comorbidities: *Standards of Care in Diabetes—2024. Diabetes Care*. 2024;47(Supplement_1):S52-S76. doi:https://doi.org/10.2337/dc24-s004

77. Umpierrez GE, Klonoff DC. Diabetes technology update: Use of insulin pumps and continuous glucose monitoring in the hospital. *Diabetes Care*. 2018;41(8):1579-1589. doi:https://doi.org/10.2337/dci18-0002

78. Battelino T, Danne T, Bergenstal RM, et al. Clinical targets for continuous glucose monitoring data interpretation: Recommendations from the International Consensus on Time in Range. *Diabetes Care*. 2019;42(8):1593-1603. doi:https://doi.org/10.2337/dci19-0028

79. Riddlesworth TD, Beck RW, Gal RL, et al. Optimal sampling duration for continuous glucose monitoring to determine long-term glycemic control. *Diabetes Technology & Therapeutics*. 2018;20(4):314-316. doi:https://doi.org/10.1089/dia.2017.0455

80. Beck J, Greenwood DA, Blanton L, et al. 2017 National Standards for Diabetes Self-Management Education and Support. *The Diabetes Educator*. 2019;46(1):46-61. doi:https://doi.org/10.1177/0145721719897952

81. Lu J, Ma X, Zhou J, et al. Association of time in range, as assessed by continuous glucose monitoring, with diabetic retinopathy in type 2 diabetes. *Diabetes Care*. Published November 1, 2018. https://doi.org/10.2337/dc18-1131

82. American Diabetes Association. Glycemic targets: Standards of Medical Care in Diabetes—2020. *Diabetes Care*. 2020;43(Supplement 1):S66-S76. doi:https://doi.org/10.2337/dc20-s006

83. Beck RW, Bergenstal RM, Cheng P, et al. The relationships between time in range, hyperglycemia metrics, and HbA1c. *Journal of Diabetes Science and Technology*. 2019;13(4):614-626. doi:https://doi.org/10.1177/1932296818822496

84. Strawbridge LM, Lloyd JT, Meadow A, Riley GF, Howell BL. One-year outcomes of diabetes self-management training among Medicare beneficiaries newly diagnosed with diabetes. *Medical Care* 2017;55(4):391-397. doi:https://doi.org/10.1097/MLR.0000000000000653

85. Davies MJ, D'Alessio DA, Fradkin J, et al. Management of hyperglycemia in type 2 diabetes, 2018. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care*. 2018;41(12):2669-2701. doi:https://doi.org/10.2337/dci18-0033

86. American Association of Diabetes Educators. An effective model of diabetes care and education: Revising the AADE7 Self-Care Behaviors®. *The Diabetes Educator*. 2020;46(2):014572171989490. doi:https://doi.org/10.1177/0145721719894903

87. ADCES7 Self-Care Behaviors for people with diabetes. ADCES. Published 2023. Accessed April 23, 2024. https://www.adces.org/diabetes-education-dsmes/adces7-self-care-behaviors

88. Beck J, Greenwood DA, Blanton L, et al. 2017 National Standards for Diabetes Self-Management Education and Support. *The Diabetes Educator*. 2017;43(5):449-464. doi:https://doi.org/10.1177/0145721717722968

89. Chrvala CA, Sherr D, Lipman RD. Diabetes self-management education for adults with type 2 diabetes mellitus: A systematic review of the effect on glycemic control. *Patient Education and Counseling*. 2019;99(6):926-943. doi:https://doi.org/10.1016/j.pec.2015.11.003

90. Powers MA, Bardsley JK, Cypress M, et al. Diabetes Self-management Education and Support in adults with type 2 diabetes: A consensus report of the American Diabetes Association. The Association of Diabetes Care and Education Specialists, the Academy of Nutrition and Dietetics, the American Academy of Family Physicians, the American Academy of PAs, the American Association of Nurse Practitioners, and the American Pharmacists Association. *Diabetes Care*. 2020;43(7):1636-1649. doi:https://doi.org/10.2337/dci20-0023

91. ElSayed NA, Aleppo G, Aroda VR, et al. Glycemic targets: Standards of Care in Diabetes—2023. *Diabetes Care*. 2022;46(Supplement_1):S97-S110. doi:https://doi.org/10.2337/dc23-s006

92. CDC. Vaccine information for adults. Vaccine Information for Adults. Accessed September 17, 2024. https://www.cdc.gov/vaccines-adults/?CDC_AAref_Val=https://www.cdc.gov/vaccines/adults/rec-vac/health-conditions/diabetes/infographic/index.html

93. Association of Diabetes Care and Education Specialists (ADCES). Vaccination Practices for Adults with Diabetes Background/Rationale and Evidence. Published 2019. Accessed April 23, 2024. https://www.adces.org/docs/default-source/practice/practice-documents/practice-papers/adces-vaccination-practices-for-adults-with-diabetes-final-4-2-20.pdf?sfvrsn=4

94. Fleischman S. I am..., I have..., I suffer from...: A linguist reflects on the language of illness and disease. *Journal of Medical Humanities*. 1999;20(1):3-32. doi:https://doi.org/10.1023/a:1022918132461

95. Benedetti F. How the doctor's words affect the patient's brain. *Evaluation & the health professions*. 2002;25(4):369-386. doi:https://doi.org/10.1177/0163278702238051

96. Dickinson JK. The experience of diabetes-related language in diabetes care. *Diabetes Spectrum*. 2017;31(1): 58-64. doi:https://doi.org/10.2337/ds16-0082

97. Association of Diabetes Care and Education Specialists. Speaking the language of diabetes. Published 2024. Accessed September 17, 2024. https://www.adces.org/docs/default-source/handouts/culturalcompetency/handout_hcp_cc_diabeteslanguage.pdf?sfvrsn=4a3a6359_25

98. Office of Disease Prevention and Health Promotion. Health equity in Healthy People 2030. Health.gov. Published 2020. Accessed April 23, 2024. https://health.gov/healthypeople/priority-areas/health-equity-healthy-people-2030

99. Braveman P, Arkin E, Orleans T, Proctor D, Plough A. What is health equity? RWJF. Published May 1, 2017. Accessed August 07, 2024. https://www.rwjf.org/en/insights/our-research/2017/05/what-is-health-equity-.html

100. County Health Rankings & Roadmaps. Explore health topics. What Impacts Health. Countyhealthrankings.org. Accessed August 07, 2024. https://www.countyhealthrankings.org/what-impacts-health/county-health-rankings-model

101. North Carolina Institute of Medicine. Healthy North Carolina 2030. NCIOM. Published December 20, 2018. Accessed August 07, 2024. https://nciom.org/healthy-north-carolina-2030/

102. County Health Rankings & Roadmaps. County Health Rankings Model. Published March 29, 2016. Accessed September 17, 2024. https://www.countyhealthrankings.org/resources/county-health-rankings-model

103. CDC. Advancing health equity. Centers for Disease Control and Prevention. Published March 15, 2024. Accessed August 07, 2024. https://www.cdc.gov/diabetes/health-equity/index.html

104. Carger E, Westen D. A new way to talk about the social determinants of health. rwjf.org. Published January 1, 2010. Accessed August 07, 2024. https://www.rwjf.org/en/insights/our-research/2010/01/a-new-way-to-talk-about-the-social-determinants-of-health.html

105. North Carolina Institute of Medicine, North Carolina Department of Health and Human Services. Healthy North Carolina 2030: A Path Towards Health. Published 2020. Accessed August 07, 2024. https://nciom.org/wp-content/uploads/2020/01/HNC-REPORT-FINAL-Spread2.pdf

106. Allen NA, Colicchio VD, Litchman ML, Gibson B, Villalta J, Sanchez-Birkhead AC. Hispanic community-engaged research: Community partners as our teachers to improve diabetes self-management. *Hispanic Health Care International*. 2019;17(3):125-132. doi:https://doi.org/10.1177/1540415319843229

107. Wroe J. How can the media be best used to influence the diabetes policy makers? *Practical Diabetes International*. 2006;23(4):178-182. doi:https://doi.org/10.1002/pdi.939

108. Gross TT, Story CR, Harvey IS, Allsopp M, Whitt-Glover M. "As a community, we need to be more health conscious": Pastors' perceptions on the health status of the Black Church and African-American communities. *Journal of racial and ethnic health disparities*. 2018;5(3):570-579. doi:https://doi.org/10.1007/s40615-017-0401-x

109. CDC. Faith Leaders Toolkit: Diabetes management and type 2 diabetes prevention. Diabetes. Published May 22, 2024. Accessed August 07, 2024. https://www.cdc.gov/diabetes/php/cbo-guidance/faith-leaders-diabetes-prevention-management.html

110. Miller RS, Mars D. Effectiveness of a diabetes education intervention in a faith-based organization utilizing the AADE7. *ADCES in Practice*. 2020;8(1):10-14. doi:https://doi.org/10.1177/2633559x20887746

111. Sawani J. A new type of church outreach: Diabetes Education. Michigan Health Lab. Published October 4, 2018. Accessed August 07, 2024. https://www.michiganmedicine.org/health-lab/new-type-church-outreach-diabetes-education

112. North Carolina's plan to address overweight and obesity. Eat Smart, Move More NC. Published 2020. Accessed March 26, 2024. https://www.eatsmartmovemorenc.com/who-we-are/#ObesityPlan

113. National Center for Biotechnology Information. 2 acting locally. Institute of Medicine (US) and National Research Council (US) Committee on Childhood Obesity Prevention Actions for Local Governments; Parker L, Burns AC, Sanchez E, ed. Washington (DC): National Academies Press (US); 2009. Accessed August 07, 2024. ncbi.nlm.nih.gov/books/NBK219685

114. Olenik NL, Fletcher LM, Gonzalvo JD. The community pharmacist as diabetes educator. *AADE in Practice*. 2015;3(5):46-50. doi:https://doi.org/10.1177/2325160315597197

115. Claypool TM. Pharmacy medication therapy management. *AADE in Practice*. 2015;3(2):12-16. doi:https://doi.org/10.1177/2325160314568368

116. Association of Diabetes Care and Education Specialists (ADCES). Community health workers as diabetes paraprofessionals in DSMES and prediabetes reviewed by professional practice committee. Published 2019. Accessed March 26, 2024. https://www.adces.org/docs/default-source/practice/practice-documents/practice-papers/adces-community-health-workers-as-diabetes-paraprofessionals-in-dsmes-and-prediabetes---final-4-1-20.pdf?sfvrsn=e4bc9858_6

117. Crespo R, Hatfield V, Hudson J, Justice M. Partnership with community health workers extends the reach of diabetes educators. *AADE in Practice*. 2015;3(2):24-29. doi:https://doi.org/10.1177/2325160315569046

118. Diabetes prevention: Interventions engaging community health workers improve risk factors and health outcomes | The community guide. www.thecommunityguide.org. Published October 18, 2022. Accessed March 26, 2024. https://www.thecommunityguide.org/news/community-health-worker-interventions-help-prevent-diabetes.html

119. Gabbay RA, Kendall D, Beebe C, et al. Addressing therapeutic inertia in 2020 and beyond: A 3-year initiative of the American Diabetes Association. *Clinical Diabetes*. 2020;38(4):371-381. doi:https://doi.org/10.2337/cd20-0053

120. American Diabetes Association. Act Now-Therapeutic Inertia in clinical practice: Self-assessment. Accessed March 26, 2024. https://professional.diabetes.org/sites/default/files/media/inertia_practice_assessment_final.pdf

121. American Diabetes Association. Getting to goal: Overcoming therapeutic inertia in diabetes care. Accessed March 26, 2024. https://professional.diabetes.org/sites/default/files/media/overcoming_therapeutic_inerita_factsheet_final.pdf

122. Blue Cross NC. Local barbershops and beauty salons are the "Heart" of new program to improve heart health. Blue Cross NC. Published 2020. Accessed March 26, 2024. https://mediacenter.bcbsnc.com/news/local-barbershops-and-beauty-salons-are-the-heart-of-new-program-to-improve-heart-health

123. Pearson TL, Bardsley J, Weiner S, Kolb L. Population health: The diabetes educator's evolving role. *The Diabetes Educator*. 2019;45(4):333-348. doi:https://doi.org/10.1177/0145721719857728

124. Green LW, Brancati FL, Albright A. Primary prevention of type 2 diabetes: integrative public health and primary care opportunities, challenges and strategies. *Family Practice*. 2012;29(suppl 1):i13-i23. doi:https://doi.org/10.1093/fampra/cmr126

125. U.S. Department of Health and Human Services. Preventing tobacco use among youth and young adults: A report of the Surgeon General. Published 2012. Accessed March 26, 2024. https://www.hhs.gov/sites/default/files/preventing-youth-tobacco-use-exec-summary.pdf

126. Lycett D, Nichols L, Ryan R, et al. The association between smoking cessation and glycaemic control in patients with type 2 diabetes: a THIN database cohort study. *The Lancet Diabetes & Endocrinology*. 2015;3(6):423-430. doi:https://doi.org/10.1016/s2213-8587(15)00082-0

127. Lajous M, Tondeur L, Fagherazzi G, de Lauzon-Guillain B, Boutron-Ruaualt MC, Clavel-Chapelon F. Childhood and adult secondhand smoke and type 2 diabetes in women. *Diabetes Care*. 2013;36(9):2720-2725. doi:https://doi.org/10.2337/dc12-2173

128. Knopf T. For many, Medicaid expansion is personal. North Carolina Health News. Published February 28, 2019. Accessed March 26, 2024. https://www.northcarolinahealthnews.org/2019/02/28/for-many-medicaid-expansion-is-personal/

129. American Diabetes Association. Introduction. *Diabetes Care*. 19(S1): S1-S118. Published January 1996. Accessed August 07, 2024. https://diabetesjournals.org/care/article/19/Supplement_1/S1/18635/Introduction

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