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Understanding Type 2 Diabetes:

Truth or Myth

Leann Marcinek, MPH, & Tricia Jefferson, RD, LDN

Overview of the Problem in Delaware

According to the Mayo Clinic, "Diabetes mellitus refers to a group of diseases that affect how your body uses blood sugar (glucose) … If you have diabetes, no matter what type, it means you have too much glucose in your blood, although the causes may differ. Too much glucose can lead to serious health problems. Chronic diabetes conditions include type 1 diabetes and type 2 diabetes. Potentially reversible diabetes conditions include prediabetes and gestational diabetes"[1]. The large majority of people with diabetes have type 2 diabetes, or, the lesser talked about, prediabetes (see Figure 1).

Figure 1. Blood Test Levels for Diagnosis of Diabetes and Prediabetes

Blood Test Levels for Diagnosis of Diabetes and Prediabetes

	A1C (percent)	Fasting Plasma Glucose (mg/dL)	Oral Glucose Tolerance Test (mg/dL)
Diabetes	6.5 or above	126 or above	200 or above
Prediabetes	5.7 to 6.4	100 to 125	140 to 199
Normal	About 5	99 or below	139 or below

Definitions: mg = milligram, dL = deciliter
For all three tests, within the prediabetes range, the higher the test result, the greater the risk of diabetes.

Diabetes is diagnosed through blood tests. Any one of the following tests can be used for diagnosis: A1C or glycohemoglobin, FPG or fasting plasma glucose, or OGTT or oral glucose tolerance.

In her article, "Reversing the Diabetes Epidemic," Dr. Rattay, Director of the Delaware Division of Public Health, says, "Although all these tests can be used to indicate diabetes or prediabetes, in some people one test will indicate a diagnosis of diabetes or prediabetes when another does not. People with differing test results may be in an early state of the disease, where blood glucose levels have not raised high enough to show on every test. Consider these variations when reviewing test results and repeat laboratory tests for confirmation."[2]

In Delaware's population of fewer than 1 million, there is a high prevalence of type 2 diabetes (see Table 1). Between 2011 and 2015, the prevalence has increased from 9.7% to 11.5%.[5] Sussex County has the highest rate at 13.7%, followed by Kent (11.9%) and New Castle (10.4%). As a whole, Delaware has the 10th highest rate of diabetes in the country.[5]

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Obesity and type 2 diabetes go hand in hand. Over the past several decades the correlation between these diseases has been demonstrated through the CDC's Adult Obesity Prevalence maps. The two conditions have trended upwards, with obesity leading and diabetes following close behind. Delaware's obesity rate is just shy of 30% of the population, which has doubled since 1990. Delaware has the 28th highest obesity rate in the country.

Obesity is not the only risk factor for type 2 diabetes. Age (particularly those aged 45 and older), being physically active less than 3 times per week, family history of type 2 diabetes, high blood pressure, and high cholesterol are also significant risk factors.

Prediabetes rates are higher than diabetes rates, affecting 1 out of every 3 adults in the United States. According to the Division of Public Health's publication, The Burden of Diabetes in Delaware 2014 Update, "8.2% of Delaware adults who were not diagnosed with diabetes report having prediabetes. Without intervention, prediabetes progresses to diabetes at the rate of 10% per year". In addition, many individuals with prediabetes have at least one co-morbidity such as obesity, heard disease, or high blood pressure. Prediabetes causes healthcare costs to increase and in Delaware, this will result in even higher rates of diabetes in the future as prediabetes transitions to diabetes. In Delaware, rates of women with gestational diabetes range from 2% to almost 9%, based on age with those being over 35 with the highest incidence. According to the CDC, women who are affected by gestational diabetes have more than a 7-fold increased risk of developing type 2 diabetes 5 to 10 years after delivery.[3]

Healthy eating and active living have long been top priorities across the state from the governor's council to community coalitions, and yet despite great efforts spent on managing the disease, numbers are continuing to move upwards.

Diabetes is a very costly disease. The obesity epidemic and resulting diabetes trend are costing our healthcare systems and our patients considerable amounts of money for a disease that is debilitating, takes away quality of life, and causes complications. In fact, a billion dollars is spent every year on managing this one chronic disease that causes so many other health problems.

Read on to see if you can discern diabetes truths from myths, and learn how you can play a role in reversing this epidemic to help Delawareans become healthier.

Table 1. Magnitude of the Problem: Delaware[3,4]

Diabetes • 6th leading cause of death in Delaware • Approximately 100,000 adults (13.2%) have diabetes • 25% have diabetes and do not know it • 23.7% of adults aged 65+ have diabetes • 5000 people are diagnosed with diabetes every year
Prediabetes • 8.6% of Delawareans have been diagnosed with prediabetes (appox 54,700 individuals) • Only 17% of actual cases of prediabetes are diagnosed, leaving many at-risk individuals unaccounted • 1 out of 3 US adults have prediabetes; 90% don't know it

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Cost of Diabetes in Delaware

- Total cost of diabetes: $1.1 billion Direct medical costs: $800 million
- Indirect costs (disability, work loss, premature death): $300 million

Truth or Myth

1. Diabetes affects genders and races equally.

MYTH. Nationally, diabetes trends higher in those aged 45+, in blacks and Latinos, and men. Delaware follows the national trends of diabetes: racially American Indians/Alaskan Natives (15.9%), non-Hispanic blacks (13.2%), and Hispanics (12.8%) have the highest rates as well as seniors (19.3%) have high rates.[4] Exceptionally, women (10.8%) and men (8.6%) in Delaware have similar rates.

As obesity is a trend setter for diabetes, obesity indicates similar patterns in Delaware. As of 2015, those aged 45-64 have the highest rate at 34.8%, compared to those 18-52 (18.2%), aged 26-44 (29.9%), and those 65+ (27.9%); racially blacks have the highest rate at 36.6%, compared with whites at 29.4% and Latinos at 35.3%. Like diabetes, men and women rates of obesity are very similar with women at 27.8% and men at 26.1%. Delaware's childhood obesity rate is high; ranking 3rd in the nation in childhood obesity, making our children at high risk for diabetes.

Similar to statistics for the adult population, African American, Native American, Hispanic, and Pacific Islander youth are most at risk for diabetes.

2. Children can develop type 2 diabetes too.

TRUTH. Children as young as 5 years old are now being diagnosed with type 2 diabetes.[6] Some studies report that between 8% and 45% of children who've been newly diagnosed with diabetes have the form known as type 2. Delaware is ranked as having the 3rd highest childhood obesity rate for children 2-4 years old, and ranked 16th for 10-17 year olds. The term "adult-onset diabetes" no longer only applies to adults; adult-onset diabetes is type 2 diabetes.[7]

For children, being overweight and having a family history of diabetes are risk factors as well. 45-80% of children who develop type 2 diabetes have at least one parent with the disease.[8] Also similar to adults, is the management of the diabetes in children. A healthy lifestyle with nutritious, balanced meals, physical activity, glucose monitoring and doctor's visits are part of important self- management. However, puberty, hormones, and peer pressure can present challenges to managing their glucose levels and maintaining the healthy lifestyle, making diabetes even more complicated for this population.[8]

Former Surgeon General Richard Carmona said it best, "we may see the first generation that will be less healthy and have a short life expectancy than their parents."

3. Diabetes is not that serious.

MYTH. Great strides have been made across Delaware, the US, and world-wide to combat diabetes. Each of the hospitals in Delaware, the Delaware Division of Public Health and community organizations, have programs and services to help those who have diabetes manage the disease. The complicated task of managing this disease includes receiving annual dilated eye

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exams, routine testing for microalbuminuria, regular dental exams, foot exams, maintaining normal levels of blood pressure, cholesterol, and lipids, and not to mention maintaining a healthy diet and physical activity levels.[9] Without urgent action, diabetes-related deaths will increase by more than 50% in the next 10 years.[10] Diabetes-related deaths are under-reported and as more is learned about the disease and the more it is recognized as a debilitating disease the more it will be tracked as a cause of death. If the current trend continues, this number will only continue to grow.

Diabetes is sometimes called a "silent disease" and may not be taken seriously for those who are at risk or have developed the disease. There may be no physical symptoms at all as the disease onsets. When symptoms do develop people may not recognize them because they are mild, such as increase urination, thirst, and hunger. Also, weight loss, fatigue, wounds that won't heal, and blurred vision may occur. Without routine bloodwork, diagnosis of this disease may be missed.

Physicians can get a sense if someone is at risk for diabetes by exmining risk factors. Like most diseases, for diabetes there are modifiable and non-modifiable risk factors (see Table 2).

Table 2. Diabetes Risk Factors

Modifiable Risk Factor	Non-modifiable Risk Factor
Physical activity level	Family history of diabetes
Overweight/obesity status	Age (increases at age 40 and 65)
Smoking status	Race or Ethnic Background
High blood pressure or cholesterol	History of Gestational Diabetes

With 1 out of 11 individuals with diabetes and an aging population, these non-modifiable risks can indicate why the disease is so prevalent. However, as discussed, with obesity being a strong precursor, the modifiable risk factors sound the alarm on how diabetes has become so prevalent.

The disease is highly undiagnosed (25% of people don't know they have it), and enormous behavior changes are needed to manage the disease. There are several high-cost, debilitating complications.

These include:

- Kidney Failure,
- Blindness,
- Stroke,
- Heart Disease,
- Loss of toes, feet, or legs.

Many individuals with prediabetes have at least one co-morbidity such as obesity, heart disease, or high blood pressure.

Dr Lenhard, the Medical Director of Christiana Care Health System's Diabetes & Metabolic Diseases Center, the Diabetes & Metabolic Research Center and Christiana Care's Weight Management Center said, "Diabetes is clearly a complicated and potentially deadly disease. But it is more than just a dangerous disease. It is one of the largest public health threats facing our civilization. That sounds alarmist, but when you consider that half of American adults have

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either diabetes or prediabetes right now, and combine this with the growth and incredibly high cost of treating diabetes it is apparent that diabetes is a major source of concern."

This disease with so many complications and comorbidities makes for a very serious condition. Our job in public health and clinical practice is to continue to inform our populations that this disease will have a negative impact on our lives and those of our loved ones. Because of its silent nature and list of complications there is a big job ahead to reverse the trend.

4. Annual out-of-pocket medical cost of someone with diabetes and associated conditions is $20,000.

TRUTH. According to one of the nation's largest insurance companies, it costs roughly $3,700 a year to treat a person with prediabetes. Without complications, the medical cost of someone with diabetes is about $9,202. Treating someone with advanced stages of diabetes and associated conditions tops $20,000 annually.[11] The American Diabetes Association estimates medical expenses about 2.3 times higher for those with diabetes than those without. When diabetes is combined with chronic complications such as neurological, cardiovascular, and renal complications the costs go up about 30%[4]!

Healthcare expenditures of diabetes are high. Diabetes, and associated complications, cost Delaware $1.1 billion a year. The costs go to institutional care, outpatient care, outpatient and medications and supplies as well as other indirect costs. Direct medical expenses for diabetes was estimated to be $818 million a year.[4]

$293 million was lost on indirect costs due to diabetes, including absenteeism, presentism, reduced productivity, disease-related disability, and early mortality.[4]

Individuals with prediabetes may be at risk for higher out-of-pocket healthcare costs should that person go on to develop type 2 diabetes. The costs for a person with prediabetes is also higher due to the comorbidities that present at this stage, such as high blood pressure and high cholesterol.

The physician appointments, medications, diabetic supplies, hospital/inpatient care and potentially eventual nursing care all add up to costs spread across the physicians, insurance, and the individual with the disease.

5. Type 2 diabetes can be prevented.

TRUTH. People with prediabetes are at risk for developing type 2 diabetes but they can significantly reduce that risk by increasing physical activity and eating a healthier diet.

Back in 2002, the National Institutes of Health started to study the effects of lifestyle modification on reducing the risk for type 2 diabetes. They tested three approaches to preventingtype 2 diabetes: making lifestyle changes, taking the diabetes medication Metformin, receiving education about diabetes (see Table 3). People in the lifestyle change group showed the best outcomes. Those who took metformin also benefited, but not to the same extent. The results showed that by losing an average of 5% in the first year of the study, people in the lifestyle change group reduced their risk of developing type 2 diabetes by 58- 71%. Those in the metformin group reduced risk by 31%.[12]

Table 3. Lifestyle Modifications for Diabetes[12]

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Intervention	Method	Risk Reduction
Making lifestyle changes	Exercise, usually by walking 5 days a week for about 30 minutes a day, and lowering their intake of fat and calories.	58%
Taking Metformin (diabetes medication)	Dose of metformin and received information about physical activity and diet.	31%
Receiving education about diabetes (Control)	Only received information about physical activity and diet and took a placebo—a pill without medication in it.	N/A

The Diabetes Prevention Program and developed, validated in a community setting, and scaled across the country. In Delaware, this program most often takes place through the YMCA, as they are the largest deliverer of the program in the state.

The YMCA's Diabetes Prevention Program helps overweight and obese adults with prediabetes adopt and maintain healthy lifestyles by eating healthier and increasing physical activity. By losing 5-7% of body weight participants reduce their chances of developing the disease. The 25 sessions take place over the course of a year in a classroom setting where participants support one another and gain lasting tools to prevent type 2 diabetes. The NIH study showed that even 10 years after completing the program participants kept the weight off and the risk for diabetes was lower.

More recently the Centers for Medicare and Medicaid (CMS) evaluated the cost effectiveness of the program. The YMCA of Delaware was one of 17 sites that enrolled over 10,000 Medicare recipients in the Diabetes Prevention Program and CMS found that Medicare can save over $2600 per individual over 15 months by having beneficiaries with prediabetes participate in the program.[13] With those outstanding results they are planning to add the program as a covered benefit, projected coverage will start in 2018. This is groundbreaking for public health as this will be the first time Medicare covers a prevention program.

Children and adolescents with obesity are at greater risk for health problems such as type 2 diabetes, hypertension, high cholesterol, stroke, and heart disease, when compared with their peers at a normal- weight.[14] These same children are 63% more likely to be bullied and often struggle with eating disorders and mental health issues, such as low self-esteem and depression.[15] Research shows adolescents with metabolic syndrome, a condition closely associated with obesity, had significantly lower arithmetic, spelling, attention, and mental flexibility, which suggests a linkage to lower academic and professional potential.

Healthy Weight and Your Child, a program at the YMCA, empowers 7-13 year olds with obesity, with the support of their families, to reach a healthy weight and live a healthier lifestyle. Through education, conversation and being physically active as a family, the participants learn goal setting and action planning as they work together to achieve healthier and more active lifestyles. Research on the program model has shown statistically significant reductions in body

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mass index, waist circumference, sedentary activities and improvements in physical activity and self-esteem at six months, also sustained at 12 months.

According to the ADA, the Division of Diabetes Translation at the CDC spent $174,878 on diabetes prevention and educational programs in Delaware in 2014. Far less spending than the billion dollars spent on management each year. “I have heard politicians say that we can’t afford to prevent diabetes and my response is that we can’t afford not to”, said Dr. Lenhard.

6. It is up to doctors alone to fix this problem.

MYTH. “The chronic nature of diabetes requires daily disease management not only by those individuals with diabetes, but also with their families and their health care team,” said Dr. Kara Odom Walker, Secretary of the Department of Health and Social Services. “As a family physician,

I have seen the benefits of patients eating well, staying active, taking their medication, and keeping their medical appointments. People with diabetes can create a healthier future for themselves as we work together to build a healthier Delaware. As a community, we must continue to partner to connect individuals with diabetes to consistent and coordinated care, to educate them on how to best manage their condition, and to intervene with individuals diagnosed with early-stage prediabetes to change their diets and fitness levels.”

It’s everyone’s job to help change the incidence rate of type 2 diabetes. Now more than ever there is a focus on partnerships to strengthen the continuum of care for patients. It’s not up to one person/group to reverse the trend of diabetes. The whole community needsto work together to test, diagnose, refer to resources, enroll in programs, and disseminate information so that there is high visibility and strong hand-holding to improve health at the population level.

How Can You Help?

Start planning. Make a list of people who are involved in combating the disease who you can work with or are currently working in the arena: physicians, community health workers, public health officials, state and federal legislators, family and friends, coalitions, community groups, and member-based associations, medical societies. Make contact with those individuals and continually connect to learn what each other is doing and how you can work together and share resources.

So many of us are tasked with reversing the trend of diabetes (and other chronic conditions) and we are more effective when we work together. Public health initiatives rarely work overnight and a community model is essential for enacting change.

Use these national and local resources as something new to try, as a stepping stone to more information, or a refresher on what already exists.

American Medical Association Screen Test Act Today (STAT) guide (www.preventdiabetesstat.org).

For the clinical community this guide can help identify and notify patients with type 2 diabetes. Using Electronic Medical Records, physicians and staff can create systems to prompt referrals to self-management and prevention programs, setting up office workflows to send referrals through

secure faxing, or send retrospective letters to patients who have diagnosable glucose levels but haven't been referred out to services.

HealthyDelaware.org (www.healthydelaware.org/Diabetes).

This website houses information and resources around diabetes. This website houses a list of all of the diabetes self- management and prevention programs in the state. Each listing has a website to the organization's program page, where one can find information about the programs, class times and locations, costs and insurance coverage. There is a link to the Diabetes Coalition Resource Guide and upcoming events for the community and professionals to share and gain information.

YMCA of Delaware (www.ymcade.org)

The YMCA of Delaware is committed to strengthening the community through youth development, healthy living and social responsibility. With 7 branches statewide, a youth resource center in downtown Wilmington, and an overnight camp and conference center in Worton, Maryland, the Y is committed to serving everyone – regardless of age, income or background. The YMCA is the community vehicle for the evidence-based Diabetes Prevention Program and Healthy Weight and Your Child program, which take place in all three counties of Delaware in the community and at the YMCA. These programs are open to members and non-members.

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