

# The Promise of Big Data in Diabetes Management

A thought paper by Scalable Health



**SCALABLE**  
HEALTH

Diabetes is a major public health issue affecting more than 400 million people worldwide. In 2012 diabetes was the direct cause of 1.5 million deaths and high blood glucose was the cause of another 2.2 million deaths according to the World Health Organization (WHO). If current trends continue, over 700 million adults worldwide would be affected with diabetes by 2025.

Diabetes is also one of the most expensive challenges facing the healthcare industry today. 20% of all healthcare dollars are spent on diabetes care representing an annual cost of 825 billion dollars. 9.1 million Americans or 9.3% of the population have diabetes. An additional 1.4 million patients are diagnosed with diabetes every year.

Having diabetes is associated with substantially higher lifetime medical expenditures despite being

associated with reduced life expectancy. The average medical expenditures among people with diagnosed diabetes were 2 times higher than what expenditures would be in the absence of diabetes. If prevention costs can be kept sufficiently low, diabetes prevention may lead to a reduction in long-term medical costs.

85-90% of diabetes cases are type 2. Type 2 diabetes is primarily lifestyle related (obesity, diet, sedentary) and studies have shown that small changes in exercise, diet and weight loss can be up to 60% effective in offsetting the advances in the disease. This represents a huge potential for value-based care models in preventing disease, better patient outcomes, reduced hospitalization and overall healthcare savings.

Diabetes is one of the most preventable conditions by changing lifestyles of individuals.

## PREDICTIVE ANALYSIS AND PREVENTIVE CARE

Population health analytics (PHA) is used for identifying those patients who have care gaps and would benefit most from additional support. PHA is key for sustained behavior change for identified members who need ongoing support outside the clinical setting, PHA provides targeted outreach to specific members at the optimal time leveraging behavioral analytics.

Population Risk Stratification integrates current cost trends, chronic conditions, and social determinants risk models and disparate sources to identify the individuals most likely to benefit from proactive care management programs.

Diabetes prevention is about changing lifestyles of high-risk individuals.

Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use are ways to prevent or delay the onset of type 2 diabetes.

Diabetes can be treated and its consequences avoided or delayed with diet, physical activity, medication and regular screening and treatment for complications.

Lifestyle changes are not easy. Thus they require constant support and encouragement. A host of fitness wearables and apps are designed to support wellness through tracking and reporting data related to nutrition and activity. This assists the user and his care team assess the progress the is being made and allow for changes to the program as needed.

# PREDIABETES INTERVENTION

In 2012, 86 million Americans age 20 and older had prediabetes; this is up from 79 million in 2010

Thanks to the positive development of technology, wearables are now emerging as one of the most effective tools for diabetic prevention.

Researchers have developed a new data-driven approach to population health in which they use machine learning to develop predictive models and risk factors for the onset of type 2 diabetes. They base the model on claims data, pharmacy records, healthcare utilization information, and laboratory results. The model identifies new risk factors for type 2 diabetes and is at least 50% better at predicting disease onset than a model based on known risk factors used for comparison.

The aim was to use data analytics to create and test a simple model for doctors that could predict which pre-diabetic patients would gain the most from treatment with a drug that prevents diabetes, or from a lifestyle change such as weight loss or regular exercise.

## Benefits:

Focus on complete view of patient and patient populations

Identify at-risk patient for preventive care

Preserve patient health, care monitoring and prevent complications

Lower personal healthcare expenditures

Prediabetes is defined as the state where a patient does not have all of the symptoms required to label them as diabetic, but their blood sugar is abnormally high.

For the quarter of study participants that the model said had the highest risk of diabetes, lifestyle interventions cut their chance of developing the disease by 28%

Healthcare analytics companies leverage existing member data with diabetes to both anticipate which patients will not take their medications and to predict the most effective interventions to influence each of those patients to take their medication. (Source: John Snow Labs)

Through robust data analysis, gaps in care can be identified for preventive measures to be taken to mitigate risks. Both providers and payers need to work together for monitoring activities across the care continuum to promptly identify care gaps and better manage care transitions.

# DIABETES POPULATION

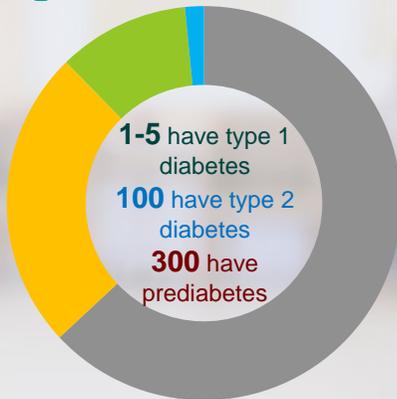


## Total : 25.8 Million People

- **DIAGNOSED:** 18.8 million people
- **UNDIAGNOSED:** 7 million people
- **PREDIABETES:** 79 million people
- **NEW CASES:** in 2016, 1.4 million Americans aged 20 years or older are newly diagnosed with diabetes each year, 3,835/day, one every 23 seconds



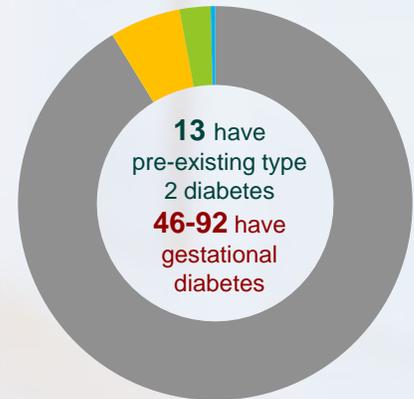
**FOR EVERY 1,000 AMERICAN ADULTS (20+ YEARS)**



**FOR EVERY 1,000 AMERICAN YOUTH (10-19 YEARS)**



**FOR EVERY 1,000 AMERICAN FEMALES WHO ARE PREGNANT**



Recent estimates project that as many as **1 in 3** American people will have diabetes in 2050 unless we take steps to Stop Diabetes

**\$1** out of every **\$5** in total healthcare costs of caring for someone with diabetes

**\$174** billion Total national cost of diagnosed diabetes

**7th** leading cause of death

**2 out of 3** people with diabetes die from heart diseases or stroke.

# DIABETES AND POPULATION HEALTH

Diabetes requires treatment and everyday strategies to control it. Suffering diabetics are faced with the task of continuous monitoring and managing a number of lifestyle factors; food, sleep, insulin level.

Smart technology exists as wearables, implants, and mobile applications to track glucose levels, share data, access relevant information, communicate with both health-care providers and others with diabetes, and, ultimately, guide you in making better decisions.

## COMORBIDITY FACTORS

Comorbidity is the presence of one or more additional diseases or disorders co-occurring with a primary disease or disorder; in the countable sense of the term, a comorbidity (plural comorbidities) is each additional disorder or disease.

Over time, diabetes can damage the heart, blood vessels, eyes, kidneys, and nerves:

- The presence of diabetes doubles the odds of depression.
- Adults with diabetes have a 2-3-fold increased risk of heart attacks and strokes.
- Combined with reduced blood flow, neuropathy (nerve damage) in the feet increases the chance of foot ulcers, infection and eventual need for limb amputation.
- Diabetic retinopathy is an important cause of blindness, and occurs as a result of long-term accumulated damage to the small blood

Wearable technology comprises gadgets that can be worn and are equipped with sensors and wireless connectivity to assist with monitoring blood sugar levels, personalizing treatment, connecting with health-care providers, and even delivering medication into the body. It's a huge departure from the traditional finger pricking method of glucose monitoring.

Diabetes is the leading cause of many other life-threatening causes like CAD, Nephropathy, Retinopathy etc.

vessels in the retina. 2.6% of global blindness can be attributed to diabetes

- Diabetes is among the leading causes of kidney failure.

Smart technology remains a promising area of innovation that can dramatically improve the lives of people with diabetes. By reducing the need for constant finger pricking or insulin injections, technology can make glucose monitoring, drug delivery, and health decision-making more efficient. This gives patients and caregivers more time to dedicate to other aspects of their lives, such as relationships and careers. Smart technology also promotes mindfulness in making daily life decisions, the discipline for self-management and self-care, and the formation of health habits. Not only can this help prevent or reduce the progression of diabetes and its complications, but it also can help reduce the costs of diabetes treatment and management.

# BIG DATA SUPPORTS A VALUE-BASED APPROACH TO DIABETES MANAGEMENT

The benefits of preventive care support a value-based approach to diabetes management. mHealth wearables allow for real-time data collection and transmission to care teams. Changes in key indicators trigger notifications to the care team allowing for intervention or changes in treatment options. Patients are able to adopt healthier lifestyle choices know to reduce advancement of the disease and other comorbidity factors, thus enjoying greater wellness and reduced treatment needs. Health

care providers are able to closely monitor patients and their progression allowing them to intervene earlier to offset disease progression. Health care organizations benefit from few patients advancing to type 2 diabetes resulting in lower healthcare costs. And finally, from a population health perspective, health care professionals gain greater insights into diabetes triggers and can design wellness programs to offset the effects of a disease that will potentially impact 700 million adults worldwide.



## About Scalable Health

Scalable Health is healthcare division of Scalable Systems focused on providing innovative products and solutions in healthcare and life sciences market.

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