The Cost and Impact of Type 2 Diabetes: Policy Recommendations for a Growing Public Health Epidemic

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Abstract

The incidence of Type 2 diabetes has increased to 9.4% of the adult population, increasing by 1.5 million from 2016 to 2017. The Center for Disease Control and Prevention estimates that 23.1 million U.S. adults have been diagnosed with Type 2 diabetes, 7.3 million are diabetic but undiagnosed and 84.1 million have pre-diabetes and are at risk. Costs for treatment of those who are diagnosed increased to $322 billion in 2015, up 31% from $245 billion in 2013 and are expected to double in the next five years [1].

Public health officials attribute the increased incidence of Type 2 diabetes to many factors: heightened incidence of obesity and hypertension, decreased physical activity and changes in eating habits among them. Many with prediabetes are unaware they're at risk; and among these, many are unwilling or unable to make lifestyle changes that might slow its progression to diagnosed Type 2 diabetes and its associated costs.

Reduction of the prevalence of Type 2 diabetes and its costs requires changes in eating habits and lifestyle changes to slow its severity for those already diagnosed and reduce its progression among persons with pre-diabetes. For those diagnosed and in treatment, medication and changes in eating habits have been the primary focus; for those with prediabetics, improvement in food choices and lifestyle changes have been encouraged, but public confusion about healthy diets and inability/unwillingness to make lifestyle changes have been problematic.

Policymakers and public health officials should take two immediate steps to address the problem: (1) The U.S. Dietary Guidelines should be updated to include food options (nutrition therapies) to address the heterogeneity of the prediabetic and Type 2 populations and provide evidence-based directives for consumers and their caregivers. (2) A public education campaign should be developed to educate consumers about the Dietary Guidelines and nutrition therapies to nullify nutritional advice that is misleading, contradictory and confusing.

Background

Diabetes is America's most pervasive chronic health condition, impacting 30.3 million adults. Type 2 diabetes accounted for 95% of diabetes-related illnesses and cost the nation more than $350 billion to treat last year. More problematically, 84 million adults and adolescents exhibit common risk factors for Type 2 diabetes, such as obesity and hypertension, although 90% are unaware [2].

Epidemiologic studies have shown the incidence of Type 2 diabetes is 50% higher among African Americans and Hispanics compared to non-Hispanic whites [3]. Clinical studies have shown those with Type 2 diabetes at higher risk of stroke, blindness, kidney disease and loss of toes, feet or legs [4]. And risk factors associated with Type 2, particularly obesity, are known to contribute significantly to its increased incidence. Notably, the National Center for Health Statistics' 2017 National Health Interview Survey found 31.5% of U.S. adults are obese -- up from 19.4% in 1997. Continued increases are forecast across all age, sex and ethnic cohorts [5].

Costs associated with Type 2 diabetes are significant and increasing: direct medical costs for Type 2 diabetes in adults, depending on their sex and age, range from $54,700 to $130,800 per individual over the course of his or her lifetime-2.3 times costs for non-diabetics [6]. In 2015, total spending for diabetes, including

direct costs and lost productivity, was $322 billion, up from $174 billion in 2007 [7]. And forecasts are that costs associated with Type 2 diabetes will ramp up because of increased prevalence and growing costs for diabetes drugs, among other factors [8].

Health services and policymakers have deduced that the increased prevalence and cost associated with Type 2 diabetes is attributable to five major factors:

Changing workplace settings: According to the U.S. Department of Labor Bureau of Labor Statistics, employment in America has shifted from farm to factory to desks at home or in congregate workplaces, and from rural to urban and suburban settings. Researchers have associated this change in work with decreased physical activity and increased adoption of sedentary lifestyles [9]. A 2015 study of workers who spend 8-12 hours at desk jobs found they had a 91% higher likelihood of developing Type 2 diabetes [10].

Changes in American demographics: Pew Research Center's "10 Demographic Trends that are Shaping the U.S. and the World" offers a compelling summary of demographic changes over the past 50 years: America is becoming more ethnically diverse; families and household composition are shifting from two parents and children to other living arrangements. And we're getting older [11]. That's led to changes in how individuals spend their time and money, what and where they eat and how they define healthiness. Notably, for three decades, more was spent on fast foods and less on healthier food options, contributing to higher incidence of obesity, heart disease and diabetes.

Healthcare system bias toward medication: The $3.3 trillion dollar U.S. health system is highly specialized: payments for primary and preventive health services are less than 8% of total funding and have been flat in recent years [12]. Clinicians are paid for the volume of patients they engage. As a result, prescribing drugs to treat medical problems is seen as a safe, efficient way to treat medical problems. For Type 2 diabetics, prescription use has become a mainstay of treatment: 76.2% of office visits result in a prescription [13].

Confusion about healthy food choices that are problematic to people with diabetes and pre-diabetes: Most Americans are confused about what constitutes a healthy food choice, according to the International Food Information Council Foundation's annual Food and Health survey [14]. Eight in 10 survey respondents said they found conflicting information about what foods to eat and what foods to avoid and half said the conflicting information confused them. Most were unable to discriminate between saturated and unsaturated fats and unaware of distinctions between genetically modified and organic foods [15]. Food packaging contributes to the confusion: "multi-grain" is confused with "whole grain," an especially important distinction for prediabetic/diabetic sufferers who have compromised insulin levels and there's widespread misunderstanding about the role carbohydrates play in raising blood sugar [16].

Policymaker prioritization: For policymakers, tackling Type 2 diabetes and the growing incidence of pre-diabetes is problematic. Conditions like heart disease or cancer impact large numbers and are associated with specialized technologies, facilities and clinicians. Improvements in the diagnosis and treatment in these diseases has been steady and public awareness is strong. Public health issues like drug abuse garner media attention, prompting policymaker action. But policymaking around Type 2 diabetes is more challenging. Root causes are associated with lifestyle factors: obesity is a major risk factor [17]. And obesity is complicated by socio-demographics correlating higher levels with lower income and certain disadvantaged groups[18]. For policymakers, addressing Type 2 diabetes goes beyond just healthcare and requires prioritization of nutrition therapy, vigilance about the food supply chain, pricing policies to make healthier foods more accessible and other actions. And these require coordination across multiple state and federal agencies and programs since food production and safety fall under the aegis of the U.S. Department of Agriculture and the Food and Drug Administration, and treatment falls under a wide range of payers including Medicare, Medicaid, private insurers and other sectors of the healthcare system.

Is Remission of Type 2 Diabetes Achievable?

Slowing the progression of Type 2 diabetes is necessary to reduce long-term costs associated with its treatment. Evidence also shows that Type 2 diabetes can be reversed with proper nutrition therapy and exercise [19].

Studies have shown that a 1% reduction in HbA1c, a key indicator of Type 2 diabetes, can be achieved through proper dieting. It also results in lower risks for heart disease, renal failure and blindness, saving $1,700 per year in medication costs [20]. In a one-year paired comparison study released in February, 2018, Type 2 diabetics who followed a low carbohydrate diet had "lower HbA1c, weight and medicine use" [21]. If 20% of the 30 million U.S. T2D sufferers made this dietary change resulting in a HbA1c reduction of 1%, savings to the U.S. healthcare system would be at least $10.2 billion annually. If the 84 million prediabetic Americans followed a similar regimen, cost savings would be even more.

Evidence-based nutrition therapies targeted to specific patient cohorts of inidividuals with Type 2 diabetes and prediabetes are underdeveloped by the American Diabetic Association. While the ADA's Guidelines are useful to individuals in good health, they inadequately differentiate between key patient cohorts for whom nutrition therapies produce significant clinical benefit [22]. A notable example is the ADA's failure to consider studies that have shown low carbohydrate diets to be safe and effective in managing

glycemic control and weight among prediabetics. Instead, the ADA's grading scheme rates them lower than plant-based options though the evidence is otherwise (See Appendix).

Nutrition therapies, properly administered, can play a larger role in Type 2 prevention, treatment and reversal strategies. Studies show a low carbohydrate diet offers therapeutic benefits to many people with diabetes as well as lowers lifetime health costs [23]. Regrettably, medications have been the default therapeutic strategy for most of those with diabetes when evidence shows other options to be more effective for many.

Where We Stand Today

Today, 84% of total U.S. health costs are attributable to chronic diseases: Type 2 diabetes is at the top of the list. Currently, the public policy framework for addressing the progression of Type 2 diabetes centers on three co-dependent strategies:

1-Primary care diagnosis and coordination: Increased access to primary care and preventive health services in local communities, especially in under-served and low-income populations has been associated with lower incidence of Type 2 diabetes [24]. Access to primary care services by physicians, nurses and allied health professionals is important to recognizing incidence of Type 2 diabetes and risks among predisposition by persons with pre-diabetes. But only one in three adults has a regular check-up, and large numbers in the population, especially younger adults, are not inclined to maintain a routine primary care regimen [25].

2-Dietary Guidelines: The U.S. Dietary Guidelines are codified in the 2015-2020 Dietary Guidelines for Americans produced by the U.S. Department of Agriculture (USDA) and Department of Health and Human Services (HHS) [26]. The U.S. Preventive Services Task Force references 'weight control' sparingly in only two of its 94 recommendations [27]. Both agencies contribute to the public's understanding of risks and conditions that lend themselves to Type 2 diabetes control, but neither incorporates the expanding body of evidence about dietary correlation to diabetes prevention. Both offer a credible perspective, but each fails to provide direction explicit to those most at risk for Type 2 diabetes.

3-Public education: Provider organizations, private health insurers, Medicaid and Medicare invest significant sums in educating consumers about risks for and mitigation of Type 2 diabetes. However, the most trusted source of patient education is the physician [28]. That's where issues in educating patients about diabetes becomes problematic. Physicians have limited time to educate their patients; most sponsor a website and provide generic materials, but customized care for Type 2 diabetics is rare.

Progress has been made in these areas, but results have been disappointing. While the public maintains healthiness as a goal and believes nutrition and regular exercise important to being healthy, only one in five exercises regularly and one in eight eats a healthy diet. And both are vital to arresting the progression of Type 2 diabetes [29].

The Policy Imperatives

Policymakers must refresh the nation's health policies as they relate to the growing prevalence, cost and impact of Type 2 diabetes. Current efforts in primary care, guideline development and public education are not slowing the growth of Type 2 diabetes and its negative impact on the healthiness of our population and awareness of the risks of diabetes.

Two immediate steps should be taken by policymakers in tandem with public health officials and clinicians:

1. The U.S. Dietary Guidelines should be updated to include food options that address the heterogeneity of the prediabetic and Type 2 populations. A one-size-fits-all approach is scientifically misleading and harmful to the public's health.

2. A public education campaign should be developed to educate U.S. consumers about nutrition therapies that address diverse populations including pre-diabetics and others and equip them to avoid nutritional advice that is misleading, contradictory and confusing.

In addition to these, consideration should also be given to:

- Updating of diagnostic screening measures used by primary care clinicians, retail clinics and other primary care venues to diagnose pre-diabetes and Type 2 diabetes. Consideration should also be given to increased nutrition therapy CME/CNE educational requisites across all primary care professions.

- Improvements in medical education to emphasize nutrition therapies

- Inclusion of explicit nutrition therapy outcomes in alternative payment programs including Medicare Shared Savings Program (Section 3022 Affordable Care Act) and others.

- Appointment of a blue-ribbon commission on nutrition therapy to modernize policies, regulations and food supply chain considerations.

Steps must be taken to contain and reverse the epidemic of Type 2 diabetes. Its impact and cost, left unchecked, will undermine the entire healthcare system. More must be done: the status quo is not working.

Appendix A Source (Citation)	Methodology	Clinical Outcome
American Journal of Clinical Nutrition (2009) "Brinkworth2: Comparison of low- and high-carbohydrate diets for type 2 diabetes management: a randomized trial." https://www.ncbi.nlm.nih.gov/ pubmed/26224300	Randomized trial conducted over 52 weeks of obese adults: Group 1: low fat/high carb diet Group 2: Low carb/high unsaturated fat/low saturated fat diet	Conclusion: 'While both groups saw similar weight loss outcomes, the low carb group had significant improvement in: Lipid profile, Blood Glucose Stability, Reduction in diabetes medication requirements.'
Diabetes/Metabolism Research and Reviews (2010) "Enhanced weight loss with protein-enriched meal replacements in subjects with the metabolic syndrome." https://www.ncbi.nlm.nih.gov/ pubmed/20578205	Randomized control trial in obese patients conducted over 52 weeks: Group 1: High protein diet (1.34 g protein/kg of bodyweight). Group 2: Normal protein diet (.8 g protein/kg of bodyweight)	Results: After 12 months of treatment: 64.5% of the subjects in the high-protein diet group vs 34.8% of the subjects in the conventional diet group no longer met three or more of the criteria for having the metabolic syndrome.
The New England Journal of Medicine Weight Loss with a Low-Carbohydrate, Mediterranean, or Low-Fat Diet http://www.nejm.org/doi/full/1 0.1056/NEJMoa0708681#t=arti cle	Randomized cohort study-- assignment of 322 obese adults assigned to 3 control groups followed for 2 years: Low fat- restricted calorie Mediterranean- restricted calorie Low carbohydrate- unrestricted calorie	Results: Low carbohydrate group lost more weight; 20% reduction in total cholesterol to HDL in low carb group vs 12% in the low-fat diet group. "Low carbohydrate diet is an effective alternative to low fat diet for weight loss."
NIH and Johns Hopkins "Low-Carb, Higher-Fat Diets Add No Arterial Health Risks to Obese People Seeking to Lose Weight" https://www.hopkinsmedicine. org/news/media/releases/low_ carb_higher_fat_diets_add_no_ arterial_health_risks_to_obese _people_seeking_to_lose_weig ht	Randomized trial	Conclusion: "Low carb/ high fat diets do not result in additional heart health risks for obese patients and are a safe and effective weight loss option."
Ajala O, English P, Pinkney J. Systematic review and metaanalysis of different dietary approaches to the management of type 2 diabetes. Am J Clin Nutr. 2013;97(3):505–16.	Meta- Analysis	Conclusion: 'Low carbohydrate diets improve heart health in individuals with Type 2 diabetes and should be considered an overall strategy in the management of the disease.'
Fields H, et al. Are lowcarbohydrate diets safe and effective? Journal of the American Osteopathic Association. 2016;116:788.	Meta- Analysis	Conclusion: 'Low carbohydrate diets are safe and effective in managing glycemic control and help achieve weight loss goals.'

Virta Health "Effectiveness and Safety of a Novel Care Model for the Management of Type 2 Diabetes at 1 Year" https://link.springer.com/article/10.1007%2Fs13300-018-0373-9	Open-Label, Non-Randomized, Controlled Study	Conclusion: 'Dietary carbohydrate restriction and continuous remote care can safely support adults with T2D to lower HbA1c, weight and medicine use.'

Disclosure

Endnotes

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