

Health Care Disparities in the Utilization of Type 2 Diabetes Prevention Services Among Ambulatory Care Patients in the United States

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ABSTRACT

Background: Exercise routines, diet management, education and Medication Therapy Management (MTM) have shown to improve glycemic control, lower blood pressure and body weight. While the majority of patients are on some form of weight management, many do not receive professional guidance to create their diet plan.

Objective: The aim of this study was to determine if the utilization of type 2 diabetes mellitus prevention services were impacted by patient and physician characteristics in visits to ambulatory providers in the United States.

Findings: A total of 1,932 patients with a primary diagnosis of Type 2 Diabetes Mellitus were extracted from the 2017 National Ambulatory Medical Care Survey database, collected by the National Center of Health Statistics. The patients' age, sex, race, gender, region, insurance and physician characteristics were among the demographic variables studied. The prevalence of lifestyle preventive services, including exercise therapy, nutrition therapy, patient education or counseling, were analyzed. Patients older than 61 years and white patients were offered more exercise therapy than their comparable demographics. The southern region of the U.S. and patients with Medicaid or state insured plans were offered and utilized the most exercise therapy, nutrition therapy and education. Family practice physicians and internists defined as primary care physicians offered the most exercise therapy, nutrition therapy and education services. Majority of the studied population were not offered exercise therapy, nutrition therapy, or education services, indicating the need for more preventative lifestyle services.

Conclusions: Overall, the findings of this study revealed that there was a significant difference in the utilization and offering of preventive resources amongst various demographic groups and physician characteristics. This confirms the prevalence of disparities in the U.S. Healthcare System and calls for the need to narrow this gap both at the policy and community level.

Keywords

Diabetes, the National Center of Health Statistics, Education, Lifestyle, Preventive Services.

Introduction

Diabetes is the seventh leading cause of death in the United States [1]. In the last 20 years, the number of adults diagnosed with

diabetes has more than doubled. In 2017, around 10% of the U.S. adult population had type 2 diabetes mellitus (T2DM), costing about \$327 billion to U.S. health systems [2,3]. Health care expenditures are higher for men, non-Hispanic Blacks and non-Hispanic whites [3]. Native American and Hispanic populations traditionally have the highest rates of diabetes, whereas, the highest rate of new cases come from Black and Hispanic populations [2]. Type 2 diabetes

can be prevented or delayed with healthy lifestyle changes, such as controlling weight, eating healthy, and being active [1].

Lifestyle management is a fundamental aspect of diabetes care and includes diabetes self-management education and support (DSMES), medical nutrition therapy (MNT), physical activity, smoking cessation counseling, and psychosocial care. Patients and care providers should focus on how to optimize lifestyle from the time of the initial comprehensive medical evaluation, throughout all subsequent evaluations and follow-up, and during the assessment of complications and management of comorbid conditions in order to enhance diabetes care [4]. There are four defined points where Diabetes patients need an evaluation of DSMES and DSMS (Diabetes Self-Management Support) by a health care provider. The first is at diagnosis, the second is annually for assessing education, nutrition and emotional needs, the third is when new complicating factors arise that may influence self-management and the fourth is when transition in care occurs [5]. Studies have found benefits from DSMS and DSMES in aspects, such as improved diabetes knowledge and self-care behaviors, lower A1C and self-reported weight, as well as better quality of life. In addition, it has demonstrated adoption healthy coping mechanism, reduced health care costs, increased use of primary and preventative care, and decrease use of acute care/inpatient hospital visits. Only 5-7% of patients that have coverage for DSMES and DSMS, through Medicare or other private insurance, actually receive it, which can be due to lack of referral or lack of recognized benefit [5].

Professional diet, exercise, and education programs are underutilized in current diabetes care. Only 24.3% of T2DM patients meet the recommended exercise goals (150 mins/week with a minimum 3 days a week) [2,5]. Men who exercise once weekly has a higher risk of developing T2DM than men who exercise five or more times a week [6]. While 77.1% of patients are on some form of weight management, many do not receive professional guidance to create their diet plan [2,5]. High quality diets are related to significant reductions in T2DM, such as patient-specific medical nutrition therapy involving low carbohydrates and low glycemic index, high protein, or with the Mediterranean diet. The Mediterranean diet alone, for the non-diabetic high cardiovascular risk patients, can reduce the incidence of T2DM by 52% [6].

The collaboration of pharmacists and physicians in the primary care setting is associated with improved diabetes outcomes and substantially reduces costs related to decreased health care services utilization [7]. Health care professionals are 2 to 3 times more likely to give general physical activity or dietary advice to patients than refer them to formal programs resulting in significant increase in activity counts from their accelerometers [8]. Over 80% of patients self-reported an increase in their activity level, significant change in their glycemic control and lipid profile, and were less likely to be hospitalized [9]. The American Diabetes Association (ADA) recommends diabetes patients to have periodic diabetes screenings by a primary care provider, endocrinologist, ophthalmologist or optometrist, podiatrist, registered dietitian nutritionist, certified diabetes care and education specialist, mental health professional and fitness professional.

The aim of this study was to determine if the utilization of type 2 diabetes mellitus prevention services were impacted by patient and physician characteristics in visits to ambulatory providers in the United States.

Methods

A total of 1,932 patients with a primary diagnosis of T2DM were extracted using ICD-10 code “E11.9” from 2017 National Ambulatory Medical Care Survey (NAMCS) database. This database is collected by the National Center of Health Statistics (NCHS), which is a division of the Department of Health and Human Services. NAMCS is designed to meet the need for objective, reliable information about provision and use of ambulatory medical care services in the United States [10]. Lifestyle Preventive Services were operationally defined as exercise therapy, nutrition therapy and education/counseling. Data were extracted, checked for integrity to fit the preset inclusion/exclusion criteria and exported into Excel®. Incomplete data entries were filtered and the usable data was coded. A total of 1,932 patients met the eligibility criteria, which formed the study sample. Independent operational factors, such as patient’s age, sex, race, region, insurance and physician characteristics were used in the analysis. Prevention services were defined as education/counseling, exercise therapy and nutrition therapy. The extracted data set was checked for integrity, equality and distribution of a number of records in every phase of analysis. The final data was exported into Statistical Package for Social Sciences (SPSS®) version 27.0 for statistical analysis. Data was analyzed using various statistical techniques, including descriptive analysis, *t* test, and analysis of variance (ANOVA) at alpha significance level of 0.05.

Results

Patients older than 61 were offered more exercise/activity therapy than the other age groups. Similarly, white patients were offered more exercise/activity therapy, as compared to the other races. Females were offered more education/counseling as compared to males. The southern region of the U.S. and those with Medicaid/state insured plans were offered the most exercise therapy, nutrition therapy and education. They were also the ones who utilized those services the most. Family practice physicians and internists were operationally defined as primary care providers (PCPs) for this study. They also offered the most exercise therapy, nutrition therapy and education services.

Majority of patients included in the study were 61 and older (45.6%), followed by the age group under 30 (19.3%), and between the ages 51-60 (18.6%). Most patients were female (55.7%). White patients (43.6%) were followed by black (23.8%) and Hispanic (16.1%). Patients from southern region of the US (37%) led this demographic followed by northeast region (23%) and western region at 20.4%.

The type of payment used the most was Medicaid/CHIP/State based programs at 36.9%, then private insurances (27.6%) and Medicare (26.2%). The most common type of prescribers were PCPs (family physicians and internists) at 53.4%, followed by

nurse practitioners (23.0%) then Endocrinologist (10.4%) (Table 1). Fifty-seven percent and 61% of the population did not receive exercise and nutrition therapies, respectively (Table 2).

Table 1: Ambulatory Visit Patterns of Patients with Type II Diabetes.

Demographic Variables	Frequency (n=1932)	Percentage (%)
Sex		
Female	1077	55.7
Male	855	44.3
Age Range		
30 and under	373	19.3
31-40	191	9.9
41-50	127	6.6
51-60	360	18.6
61 and above	881	45.6
Race		
White	842	43.6
Black	459	23.8
Asian	180	9.3
Hispanic	311	16.1
Other	140	7.2
Insurance		
Private insurance	533	27.6
Medicare	507	26.2
Medicaid	712	36.9
Other	180	9.3
Physician Specialty		
Family Physicians/ Internists	1031	53.4
Endocrinologists	200	10.4
Nurse Practitioners	445	23.0
Physician Assistants	76	3.9
All other specialties	180	9.3
Region		
Northeast	445	23.0
Midwest	378	19.6
South	714	37.0
West	395	20.4

Table 2: Preventative Lifestyle Services Utilization Patterns.

Lifestyle Modification	Frequency (n=1932)	Percentage (%)
Exercise Therapy		
Offered	831	43.0
Not Offered	1101	57.0
Nutrition Therapy		
Offered	747	38.7
Not Offered	1185	61.3
Education/Counseling		
Offered	732	37.9
Not Offered	1200	62.1

Education/counseling was not offered to 62% of the population. Patients that were the age of 60 and below utilized exercise therapy the least ($p=0.002$). Patients that were 61 and older utilized exercise therapy the most ($p=0.002$). Females utilized education/counseling more ($p=0.048$). White populations utilized exercise therapy the most ($p=0.004$). The Midwest utilized less exercise therapy ($p=0.008$), nutrition therapy ($p<0.001$) and education/counseling ($p<0.001$) compared to all other regions. Patients from

the South utilized exercise therapy ($p=0.008$), nutrition therapy ($p<0.001$) and education counseling ($p<0.001$) the most compared to all other regions.

Medicaid/State-based Programs offered the most exercise therapy ($p=0.016$), nutrition therapy ($p=0.003$) and education/counseling ($p=0.001$) services. Physician Assistants and Endocrinologists offered less exercise therapy ($p<0.001$), nutrition therapy ($p<0.001$) and education/counseling ($p<0.001$) services. PCP offered the most exercise therapy ($p<0.001$) nutrition therapy ($p<0.001$) and education/counseling ($p<0.001$) services (Table 3).

Independent Variable	Lifestyle modifications	ANOVA Significance (P)
Age	Exercise Therapy	0.002*
	Nutrition Therapy	0.051
	Education/Counseling	0.089
Sex	Exercise Therapy	0.203
	Nutrition Therapy	0.066
	Education/Counseling	0.048*
Race	Exercise Therapy	0.004*
	Nutrition Therapy	0.123
	Education/Counseling	0.088
Region	Exercise Therapy	0.008*
	Nutrition Therapy	<0.001*
	Education/Counseling	<0.001*
Insurance	Exercise Therapy	0.016*
	Nutrition Therapy	0.003*
	Education/Counseling	0.001*
Physician Specialty	Exercise Therapy	<0.001*
	Nutrition Therapy	<0.001*
	Education/Counseling	<0.001*

Conclusion

The majority of the studied population were not offered exercise therapy, nutrition therapy, or education/counseling services, indicating the need for utilizing more preventative lifestyle services.

Medicaid (73.4 million people in US 2017) offered the most (37.9%) services. This can be explained by the fact that Medicaid exceeded Medicare by 16.7 million [4,11]. The Midwest used less services, however this may be tied to other factors such as disease severity or current amount of exercise. The South region got the most therapy and counseling compared to the other regions, which can be due to the fact that there are more Medicaid beneficiaries in that region. This goes hand in hand with another finding of this study about Medicaid beneficiaries being provided more services than other insurances.

Research has proven that there are psychosocial, behavioral, and clinical differences between men and women when it comes to their risk, views, and outcomes of diabetes [12]. It was found that women had higher expectations for the benefits of self-management and a greater amount social support from their diabetes health care team. The study concluded that for men with diabetes, primary care physicians should concentrate on encouraging diabetes self-management education sessions and counseling for self-care. It is be beneficial to provide counseling, regular checkups, glucose/

calories monitoring for containing the severity of diabetes, brochures, as well as applications that can be downloaded on a device. Education and counseling were the least utilized form of lifestyle modification offered compared to nutrition therapy and exercise therapy. Exercise and Nutritional Therapy counselling should happen at every session that occurs with Ambulatory Care, as this is a nonpharmacologic therapy and can benefit the patients profoundly [13].

The study findings were limited to ambulatory visits in 2017 and by the operational definitions of this study. This study did not include pre-diabetic patient, and did not have a measure of severity, which may be confounding factors.

There is a significant need for more PCPs warranting an expanded role for Pharmacists as a provider of these services. Pharmacists play an important role and further research and involvement of other health care professionals is necessary to help expand more on these services. The integration of pharmacists in collaboration with physicians to provide patient-centered care in an ambulatory setting has reported to achieve quality outcomes related to chronic conditions such as diabetes [14]. DSME, DSMS, and Telehealth should be explored further to maximize their potential benefits. Preventative lifestyle services should be implemented more proactively by policy-makers, healthcare organizations, medical professionals, and community members to lower comorbidities, disabilities, and mortality thereby improving the overall quality of life and saving costs for diabetic patients.

A large number of the population, including the elderly, low income, and minority groups, and those located in remote areas are disproportionately affected by the lack of care [15]. Early intervention and prevention provided by primary care providers offer opportunities for improving access to care. Further research should address demographic disparities, resource allocations, and appropriate interventions to remove the barriers and improve overall health and quality of life for diabetic patients.

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