Trends in Lifestyle Counseling for Adults With and Without Diabetes in the U.S., 2005−2015

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Introduction: Strong evidence shows that lifestyle change and weight loss stimulated by counseling improve glycemic control and lower comorbidities for patients with diabetes, but it is unclear whether diet or physical activity counseling for patients with diabetes in ambulatory settings has actually been responsive to this evidence.

Methods: Data from the 2005−2015 National Ambulatory Medical Care Surveys were used to assess trends in provider-reported diet or exercise counseling during ambulatory care visits. The data were pooled and multivariate logistic regression models were built, adjusting for patient-, provider-, and practice-level characteristics to examine whether the provision of counseling varied by these characteristics. Data were analyzed from September 2018 to December 2018.

Results: There were 42,234 adults with diabetes and 272,094 adults without diabetes. The proportions of patients with provider-reported Type 2 diabetes who received any diet or exercise counseling were no different over time, 30% in 2005 (95% CI=25%, 35%) and 25% in 2015 (95% CI=18%, 31%). Lower proportions of those without diabetes received any counseling, 17% in 2005 (95% CI=14%, 19%) and 15% in 2015 (95% CI=11%, 18%). Adjusted models showed that Hispanic patients had a higher likelihood of receiving diet or exercise counseling, compared with whites (OR=1.38, 95% CI=1.09, 1.75). Those aged 30−49 years were more likely to receive diet or exercise counseling than those aged >75 years (OR=1.51, 95% CI=1.27, 1.80). Compared with rural areas and other providers, visits in a metropolitan area (OR=1.27, 95% CI=1.09, 1.47) or with an advanced practice provider (OR=1.66, 95% CI=1.00, 2.75) had a higher likelihood of any diet or exercise counseling delivery.

Conclusions: Less than 30% of Americans with diabetes receive diet or exercise counseling in ambulatory visits, and this proportion has not changed significantly in a decade. Future interventions should focus on addressing this gap in counseling.
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INTRODUCTION

Diabetes is costly and burdensome, affecting more than 30 million Americans, costing $327 billion in annual direct medical costs and lost productivity.[1] Complications from diabetes are preventable through improved glycemic and cardiovascular risk factor control.[2,3] To sustainably achieve control of multiple risk factors requires efforts on the part of (1) clinicians—to attentively monitor, initiate, and increase lifestyle guidance and medications as needed for patients and (2) patients—to adopt and maintain recommended behavior change. As such, efforts to improve self-management and reduce risk for patients with diabetes are a major focus of translational research.

Empirical evidence from the last 15 years suggests that lifestyle changes, such as eating a healthy diet and

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participating in adequate physical activity, can improve glycemic control among patients with diabetes.[4−7] The Look AHEAD (Action for Health in Diabetes) study, a randomized trial of an intensive lifestyle intervention focused on weight reduction for participants with diabetes, compared with usual care, demonstrated improved glycemic control, blood pressure control, and lipid control for participants in the intervention group.[4] Furthermore, several large RCTs have demonstrated the effectiveness of diet and exercise interventions to prevent or delay diabetes in at-risk groups.[6,8−10]

Although lifestyle modification can be approached in several ways, the clinic visit may represent a critical opportunity to provide lifestyle guidance. The average adult visits a physician 4 times per year and cites their provider as a credible source of health information.[11,12] Moreover, recent studies suggest that providing frequent counseling in routine care settings is associated with faster achievement of glycemic and cardiovascular risk factor control.[13] Based on this accumulation of evidence, most professional societies recommend that providers offer lifestyle counseling related to diet and exercise for patients with diabetes.[14−16]

Given this compelling evidence supporting lifestyle counseling, and the importance of healthcare providers as purveyors of this counseling, this study sought to understand trends in diet and exercise counseling provided to adults with diabetes in U.S. ambulatory settings. Variation in counseling by patient, provider, and practice characteristics was also examined. The study also examined counseling provided to patients without a diagnosis of Type 2 diabetes, by diabetes risk factors.

METHODS

This study used data from the National Ambulatory Medical Care Survey (NAMCS) from 2005 to 2015. NAMCS is an annual cross-sectional survey, administered by the National Center for Health Statistics, which has captured healthcare information provided by nonfederally employed office-based physicians since 1973.[17] NAMCS uses multistage probability sampling procedures to enable data collection that are representative of the U.S. population accessing ambulatory care. The sample size and response rates vary per year, with responses ranging from 41.4% to 70.4% from 2005 to 2015.

The unit of analysis was the patient visit. Physicians, with staff assistance, were asked to complete a patient record form for 30 visits during a designated randomly selected 1-week period of the year. Item nonresponse rates were generally <5%.[18] Starting in 2012, the U.S. Census Bureau, the data collection field agents for NAMCS, changed their data collection approach to an electronic computerized instrument. In addition, to support this change, the Census Bureau assigned field agents for data abstraction rather than relying on clinic staff.[19]

The analysis was conducted from September to December 2018. This study was deemed exempt from review by the Emory University IRB, as NAMCS is a publicly available data set that contains no patient identifiers. This study has been reported in accordance with the STROBE reporting guidelines.[20]

Study Population

The analysis was restricted to nonsurgical visits and identified patients with diabetes if a type 2 diabetes mellitus diagnosis was selected by the provider under the chronic conditions section of the patient encounter form. This method of identifying patients with diabetes yielded prevalence estimates similar to national estimates for each year that was included in the analysis.[21] All other visits were considered a comparison population without diabetes.

Measures

The dependent variables for this analysis were the provision of diet or exercise counseling during the patient visit. Physicians, staff, or field representatives collected this data by marking a check box question on the NAMCS patient encounter form if diet or physical activity counseling were identified during chart review.

The study examined a range of patient-, provider-, practice-, and diabetes-related factors that may influence the likelihood of receiving diet or physical activity counseling.

Patient-level characteristics included sociodemographic data for patients such as race/ethnicity, insurance type (private or non-private [Medicare, Medicaid, workers' compensation, self-pay, or charity]), age, and sex. Each patient visit was classified as either (1) new or return and (2) acute or nonacute. All new or return acute visits were grouped together, as these were considered less likely to be influenced by previous visits; the remainder of visits were classified as return nonacute.

The NAMCS encounter forms document the type of health provider seen. The following categories were used in this analysis: physician (includes staff physician, resident/intern, and other physician), advanced practice provider (APP; includes physician assistants, nurse practitioners, and nurse midwives), nursing staff (includes registered nurses and licensed practice nurses), multiple providers seen (e.g., physician followed by nursing staff), and other (visits that did not fit one of the above listed categories). NAMCS also reports physician specialty; this was divided into the following categories: family practice/general practice, internal medicine, cardiology, and all other specialties.

Practice characteristics including ownership of the practice (physician-owned, health system−owned, or integrated health system−owned) and percentage revenue coming from HMOs were examined. Metropolitan statistical area (yes/no) and geographic region were used to describe the location of the practice. Regions were designated as Northeast, Midwest, South, and West.

The NAMCS assesses several diabetes risk factors including obesity, hyperlipidemia, and hypertension. These diabetes risk factors were identified based on provider/staff reports on the patient encounter form based on their review of patient charts.

Statistical Analysis

Adult ambulatory care visit was the unit of analysis throughout. Visit weights (assigned by NAMCS) were used to account for unequal selection probabilities resulting from sample design and nonresponse. All analyses were performed using Stata, version 14.0. Weighted means with 95% CIs are reported, and nonoverlapping CIs and $p<0.05$ were used to assess for statistical significance.

Table 1. Comparison of Demographic Characteristics by Diabetes Status, NAMCS 2005−2015

Characteristics	No diabetes (n=272,094)	Diabetes (n=42,234)
Race/ethnicity (%)		
White, non-Hispanic	75.1 ± 0.6	67.4 ± 1.1
Black, non-Hispanic	9.6 ± 0.5	13.6 ± 0.8
Other, non-Hispanic	4.6 ± 0.4	5.4 ± 0.6
Hispanic	10.3 ± 0.5	13 ± 1.1
Medical insurance (%)		
Private	54.6 ± 0.5	38.7 ± 0.6
Nonprivate	45.4 ± 0.6	61.4 ± 0.7
Age (years)		
18−29	13.4 ± 0.2	1.9 ± 0.2
30−49	29.6 ± 0.3	14.2 ± 0.3
50−64	27 ± 0.2	34 ± 0.4
65−74	14.9 ± 0.2	26.6 ± 0.3
≥75	15.2 ± 0.3	23.3 ± 0.4
Sex (%)		
Female	62.3 ± 0.3	53.2 ± 0.4
Male	37.7 ± 0.3	46.8 ± 0.4
Geographic region (%)		
Northeast	19.9 ± 0.9	18.1 ± 1
Midwest	20 ± 1.1	20.3 ± 1.1
South	37.8 ± 1.4	40 ± 1.6
West	22.3 ± 1.1	21.6 ± 1.4
Metropolitan statistical area (%)		
Yes	89.4 ± 1.9	88.3 ± 2.1
No	10.6 ± 1.9	11.7 ± 2.1
Practice ownership (%)		
Physician owned	82.1 ± 0.7	80.7 ± 0.8
Health system owned	7.2 ± 0.4	8.9 ± 0.6
Integrated health system owned	10.7 ± 0.6	10.4 ± 0.7
Percentage of revenue from HMO contracts		
≤50%	63.1 ± 1.2	66.5 ± 1.5
≥51%	36.9 ± 1	33.5 ± 1.2
Visit type (%)		
New or acute visit	48.3 ± 0.4	38.6 ± 0.5
Return nonacute visit	51.7 ± 0.4	61.4 ± 0.5
Physician specialty (%)		
General/Family practice	24.6 ± 0.8	27.9 ± 1
Internal medicine	17.2 ± 0.6	26 ± 0.9
Cardiology	3.9 ± 0.2	5.8 ± 0.3
Other	54.3 ± 0.8	40.3 ± 1.1
Health provider type (%)		
Nursing staff	0.4 ± 0.1	0.3 ± 0.1
Physicians/residents	44.7 ± 1.1	43.4 ± 1.4
Multiple providers	53.7 ± 1	55.4 ± 1.2
Risk factors (%)		
None	63.5 ± 0.5	22.4 ± 0.6
Hyperlipidemia only	5.5 ± 0.1	7.6 ± 0.3

(continued)

Table 1. Comparison of Demographic Characteristics by Diabetes Status, NAMCS 2005−2015 (*continued*)

Characteristics	No diabetes (n=272,094)	Diabetes (n=42,234)
Hypertension only	15.1 ± 0.2	26 ± 0.6
Obesity only	3.1 ± 0.1	2.8 ± 0.1
2 or more factors	12.8 ± 0.3	41.2 ± 0.8

Note: Data are mean ± SD or percentage.
NAMCS, National Ambulatory Medical Care Surveys.

Stata's multiple imputation procedure uses the pattern of missing data to create imputed data for missing variables, conducts analysis on the complete-data and mi-data sets, and pools these results to generate adjusted SEs for the final analysis. The authors imputed 4 data sets for (1) patient insurance status (missing in 4.9% of the data), (2) practice ownership (2% missing), (3) percentage of revenue coming from HMO contacts (20.8% missing), and (4) provider type (0.3% missing). The remaining analysis variables were used as independent variables in a multivariate normal logistic imputation regression.

National estimates of the overall number of visits for the period assessed for patients with and without diabetes were obtained. Proportions of visits of patients with and without diabetes in which counseling on (1) diet, (2) exercise, and (3) diet or exercise was offered were then estimated. To examine trends in lifestyle counseling over time, the prevalence of counseling during visits in each year of the survey sample was estimated.

The cross-sectional data were first pooled from 2005 to 2015, then multivariate logistic regression modeling was conducted to assess the associations between patient-, provider-, and practice-level characteristics and year of survey (in 2-year intervals) with the provision of diet or exercise counseling during the ambulatory care visit in patients with diabetes. To determine the independent associations between 3 diabetes risk factors (obesity, hyperlipidemia, and hypertension) with the provision of diet and exercise counseling, the multivariate model was expanded to include mutually exclusive categories of no risk factors, hyperlipidemia only, hypertension only, obesity only, and 2 or more risk factors. For this model, analysis was restricted to patients without a diabetes diagnosis.

RESULTS

From 2005 to 2015, there were a total of 42,234 visits by patients with diabetes and 272,094 visits by patients without diabetes (Table 1).

Among visits by patients with diabetes, national proportions of diet and exercise counseling offered during adult office visits showed a nonsignificant decline from 2005 to 2015 (Figure 1). In 2005, diet counseling was provided during 27% (95% CI=22%, 32%), exercise counseling was reported in 17% (95% CI=15%, 28%), and any diet or exercise counseling was reported in 30% (95% CI=25%, 35%) of visits by patients with diabetes (Appendix Table 1, available online). There was a
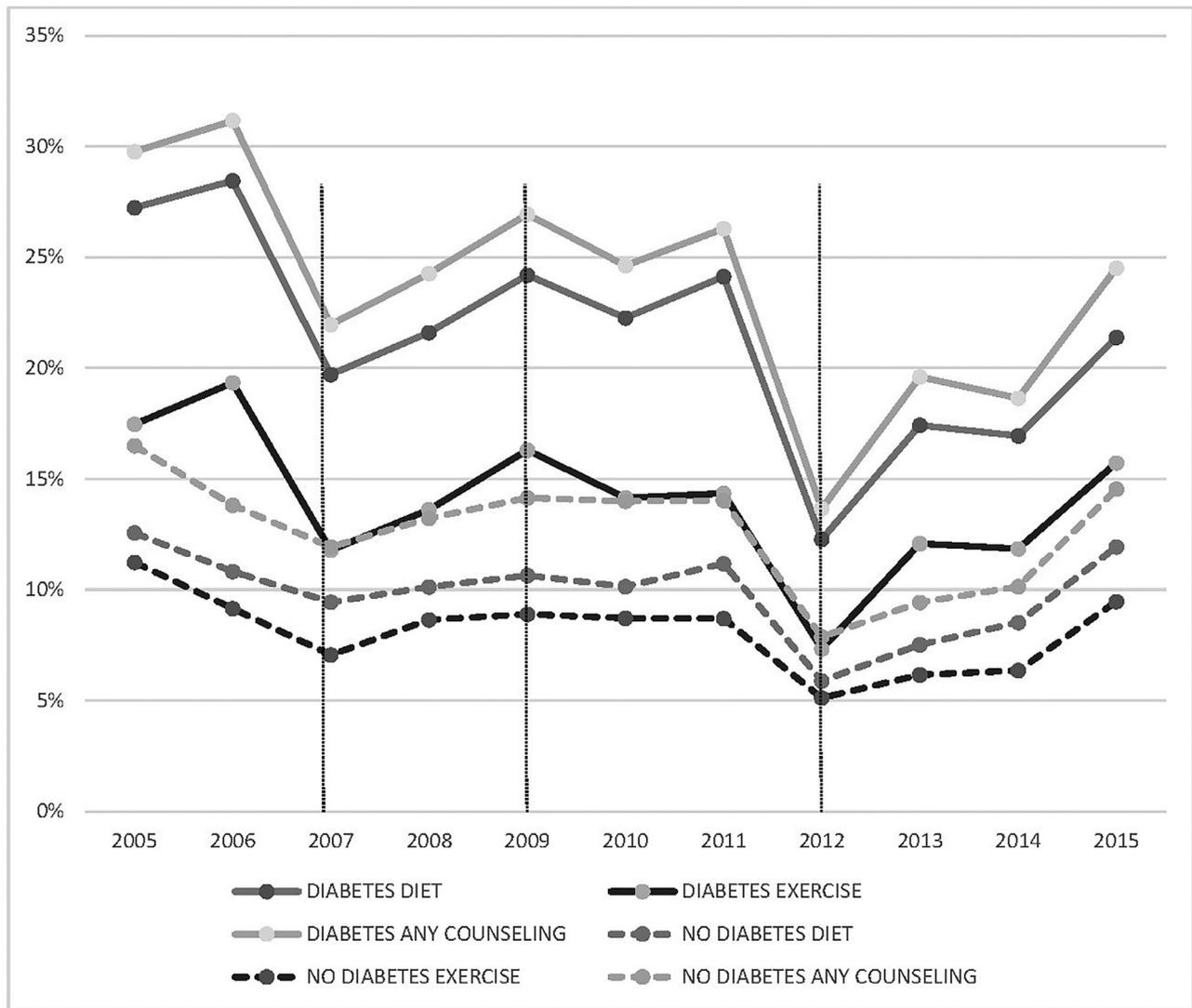
Figure 1. National trends in diet and exercise counseling during visits by adults, 2005−2015.
Note: Vertical lines represent major studies of lifestyle interventions and guideline changes. 2007: 1-year Look AHEAD trial results; 2009: 10-year Diabetes Prevention Program results; 2012: American Diabetes Association and U.S. Preventive Services Task Force recommendations for lifestyle counseling.[4,15,22]
AHEAD, Action for Health in Diabetes.

significant drop noted in 2012, with rates of diet counseling reported in 12% (95% CI=10%, 14%) and exercise counseling reported during 7% (95% CI=6%, 9%) of diabetes patient visits. By 2015, the proportions were similar to 2005, with 21% (95% CI=15%, 28%) for diet counseling, 16% (95% CI=10%, 21%) for exercise counseling, and 25% (95% CI=18%, 31%) receiving any diet or exercise counseling.

Among visits of patients without a diagnosis of diabetes, national proportions were lower and similarly showed a nonsignificant decline from 2005 to 2015 (Figure 1, Appendix Table 1, available online). For those without diabetes, the proportion of visits in 2015 with

any diet or exercise counseling were 15% (95% CI=11%, 18%), with 12% (95% CI=9%, 15%) for diet and 9% (95% CI=6%, 12%) for exercise.

In the pooled cross-sectional analyses for the study period (2005−2015), for diet counseling, patients with diabetes who identified as Hispanic had 1.38 (95% CI=1.03, 1.85) times higher odds of receiving counseling when compared with white non-Hispanics (Table 2; adjusted marginal effects available upon request). Younger age was associated with higher odds of receiving diet counseling versus those aged >75 years. The highest odds of diet counseling were for those aged 30−49 years (OR=1.48, 95% CI=1.18, 1.82).

Table 2. Odds of Counseling by Visit, Patient, Physician, and Provider Characteristics in Adults With Diabetes, 2005−2015

Characteristics	Diet counseling AOR (95% CI)	Exercise counseling AOR (95% CI)	Any counseling AOR (95% CI)
Race/ethnicity			
White, non-Hispanic	1.00 (ref)	1.00 (ref)	1.00 (ref)
Black, non-Hispanic	1.07 (0.91, 1.26)	0.89 (0.72, 1.10)	1.05 (0.90, 1.23)
Other, non-Hispanic	1.08 (0.84, 1.37)	1.24 (0.80, 1.91)	1.22 (0.90, 1.67)
Hispanic	1.38 (1.09, 1.75)	1.40 (1.08, 1.83)	1.37 (1.10, 1.71)
Medical insurance			
Private	1.24 (1.11, 1.39)	1.23 (1.07, 1.41)	1.20 (1.08, 1.34)
Nonprivate	1.00 (ref)	1.00 (ref)	1.00 (ref)
Age (years)			
18−29	1.46 (0.97, 2.19)	1.23 (0.78, 1.92)	1.36 (0.91, 2.01)
30−49	1.48 (1.24, 1.78)	1.63 (1.33, 1.99)	1.51 (1.27, 1.80)
50−64	1.32 (1.14, 1.52)	1.52 (1.30, 1.79)	1.32 (1.15, 1.52)
65−74	1.26 (1.11, 1.44)	1.43 (1.21, 1.69)	1.27 (1.13, 1.44)
≥75	1.00 (ref)	1.00 (ref)	1.00 (ref)
Sex			
Female	1.00 (0.93, 1.07)	0.93 (0.85, 1.01)	0.97 (0.91, 1.04)
Male	1.00 (ref)	1.00 (ref)	1.00 (ref)
Geographic region			
Northeast	1.42 (1.07, 1.89)	1.03 (0.72, 1.45)	1.30 (0.99, 1.72)
Midwest	0.96 (0.75, 1.23)	0.74 (0.56, 0.98)	0.89 (0.70, 1.13)
South	0.89 (0.68, 1.15)	0.78 (0.57, 1.05)	0.83 (0.65, 1.05)
West	1.00 (ref)	1.00 (ref)	1.00 (ref)
Metropolitan statistical area			
Yes	1.33 (1.14, 1.55)	1.35 (1.07, 1.71)	1.27 (1.09, 1.47)
No	1.00 (ref)	1.00 (ref)	1.00 (ref)
Practice ownership			
Physician owned	1.09 (0.87, 1.36)	1.08 (0.83, 1.41)	1.11 (0.90, 1.36)
Health system owned	1.15 (0.84, 1.56)	1.08 (0.73, 1.60)	1.17 (0.87, 1.58)
Integrated health system owned	1.00 (ref)	1.00 (ref)	1.00 (ref)
Percentage of revenue from HMO contracts			
≤50%	1.00 (ref)	1.00 (ref)	1.00 (ref)
≥51%	1.10 (0.93, 1.29)	1.05 (0.87, 1.27)	1.10 (0.94, 1.29)
Visit type			
New or acute visit	1.00 (ref)	1.00 (ref)	1.00 (ref)
Return nonacute visit	1.55 (1.36, 1.77)	1.51 (1.29, 1.78)	1.50 (1.32, 1.70)
Physician specialty			
General/Family practice	1.00 (ref)	1.00 (ref)	1.00 (ref)
Internal medicine	1.14 (0.91, 1.42)	1.02 (0.79, 1.33)	1.14 (0.92, 1.40)
Cardiology	0.77 (0.58, 1.02)	1.02 (0.74, 1.40)	0.82 (0.63, 1.07)
Other	0.47 (0.37, 0.58)	0.49 (0.38, 0.64)	0.51 (0.41, 0.63)
Health provider type			
Nursing staff	0.23 (0.07, 0.73)	0.34 (0.10, 1.17)	0.20 (0.06, 0.65)
Physicians/residents	1.00 (ref)	1.00 (ref)	1.00 (ref)
Physician assistant/Nurse Practitioner	1.84 (1.09, 3.1)	1.83 (0.94, 3.56)	1.66 (1.00, 2.75)
Other	0.40 (0.17, 0.95)	0.63 (0.25, 1.59)	0.50 (0.24, 1.04)
Multiple providers	1.22 (1.02, 1.45)	1.23 (1.01, 1.51)	1.25 (1.06, 1.48)
Year			
2005−2006	1.34 (0.88, 2.06)	1.15 (0.70, 1.88)	1.27 (0.84, 1.92)
2007−2008	0.97 (0.66, 1.42)	0.81 (0.52, 1.24)	0.96 (0.66, 1.38)

Table 2. Odds of Counseling by Visit, Patient, Physician, and Provider Characteristics in Adults With Diabetes, 2005−2015 (*continued*)

Characteristics	Diet counseling AOR (95% CI)	Exercise counseling AOR (95% CI)	Any counseling AOR (95% CI)
2009−2010	1.17 (0.79, 1.73)	1.04 (0.67, 1.62)	1.14 (0.78, 1.66)
2011−2012	0.91 (0.61, 1.36)	0.72 (0.45, 1.17)	0.86 (0.58, 1.27)
2013−2014	0.78 (0.52, 1.15)	0.75 (0.48, 1.18)	0.75 (0.51, 1.09)
2015	1.00 (ref)	1.00 (ref)	1.00 (ref)
Intercept	0.11 (0.06, 0.19)	0.08 (0.04, 0.16)	0.14 (0.09, 0.23)

Note: N=42,234.

For exercise counseling, patients who identified as Hispanic had higher odds of receiving counseling than white non-Hispanics (OR=1.40, 95% CI=1.08, 1.83). Younger age was also associated with higher odds of receiving exercise counseling, with those aged 30−49 years having 1.63 (95% CI=1.33, 1.99) times the odds of receiving exercise counseling versus those aged >75 years.

Patients seen by an APP had 1.84 times the odds of receiving diet counseling (95% CI=1.09, 3.10) and 1.66 times the odds of any diet or exercise counseling (95% CI=1.00, 2.75) when compared with patients seen by a physician/resident. Patients who saw multiple providers in their visit were more likely to receive any diet or exercise counseling (OR=1.25, 95% CI=1.06, 1.48).

Practice ownership was not associated with a significant difference in odds of receiving counseling. There was no significant regional variation in the provision of diet or exercise counseling. Compared with rural areas, patients in metropolitan statistical areas had odds of receiving diet counseling that were about 30% higher (OR=1.33, 95% CI=1.14, 1.55).

After appropriately controlling for all aforementioned independent variables, the likelihood of diet and exercise counseling for those patients at risk for diabetes, defined as those with either hypertension, hyperlipidemia, or obesity, but no diagnosis of diabetes, was examined. Patients with these risk factors were significantly more likely to receive diet or exercise counseling than those with none of these risk factors (Table 3). Obesity only was associated with the highest odds of receiving either type of counseling (diet: OR=5.32, 95% CI=4.88, 5.80; exercise: OR=4.37, 95% CI=3.98, 4.78; any: OR=4.56, 95% CI=4.20, 4.94).

DISCUSSION

This study found low rates of diet and exercise counseling for Americans with and without diabetes from 2005 to 2015 during ambulatory office visits. Based on provider reporting, from 2005 to 2015, diet counseling was provided at <30% of visits. Exercise counseling was provided at <20% office visits of patients with diabetes. There was no improvement from 2005 to 2015. This substantial gap in preventive service delivery has major health, societal, and economic implications for large portions of the U.S. population and their ongoing well-being.

During the analysis time period, several seminal studies provided strong support for lifestyle counseling that shaped recommendations for patients with diabetes.[23] Thus, although a cadre of national recommendations exist, results from this study suggest that the provision of diet and exercise counseling has not increased in response to this evidence and remains suboptimal.

Consistent with this study's findings, previous studies have demonstrated missed opportunities to provide counseling in office-based settings.[24] In a study of patients at risk for cardiovascular disease, diet and physical activity counseling occurred in <45% and <30%, respectively, from 1992 to 2000.[25] A study from the

Table 3. Odds of Receiving Counseling by Diabetes Risk Factors in Adults Without Diabetes, 2005−2015

Risk factor	Population without diabetes[a] n=272,094	Diet counseling AOR[b] (95% CI)	Exercise counseling AOR[b] (95% CI)	Any counseling AOR[b] (95% CI)
None	63.5 ± 0.5	1.00 (ref)	1.00 (ref)	1.00 (ref)
Hyperlipidemia only	5.5 ± 0.1	2.90 (2.66, 3.16)	2.17 (1.96, 2.41)	2.55 (2.35, 2.77)
Hypertension only	15.1 ± 0.2	1.60 (1.49, 1.72)	1.34 (1.24, 1.45)	1.46 (1.37, 1.56)
Obesity only	3.1 ± 0.1	5.32 (4.88, 5.80)	4.37 (3.98, 4.78)	4.56 (4.20, 4.94)
2 or more factors	12.8 ± 0.3	3.89 (3.64, 4.17)	2.94 (2.73, 3.16)	3.27 (3.08, 3.48)

Note: [a]First column is % ± SD.
[b]Covariates include race/ethnicity, insurance status, age, sex, visit type, physician specialty, health provider type, health provider region, HMO status, provider practice ownership, and survey year.

period before this assessment found that patients with diabetes were more likely to report receiving physical activity and weight loss counseling than patients without diabetes, but <50% received weight loss counseling and <70% received physical activity counseling.[26] It appears, therefore, that the downward trend in counseling has been ongoing for the past 2 decades and has been occurring in people with and without diabetes, with no major increases seen over the whole period.

The low proportions in counseling seen in ambulatory office visits during the study period may be due to a number of factors. First, this may reflect challenges in documentation. During the period of this study, federal policy changed with the 2009 Health Information Technology for Economic and Clinical Health Act, which established the Meaningful Use Incentive Program for eligible Medicare providers to use electronic health records.[27] With this incentive program, there has been a large uptick in adoption and utilization of electronic health records; however, several barriers to implementation have been cited.[28] Notably, providers have cited major disruptions to clinic workflow and difficulty utilizing performance and quality tracking measures.[28—30] Second, there were a number of novel medications introduced during this period to treat diabetes and an increasing trend in the use of medications, which may be attributed to new standards in medical care recommendations that emphasize oral medications and insulin for the treatment of diabetes.[31,32] In one study using pharmacy claims data, there was a 97% increase in metformin use from 2003 to 2012.[33] These trends in medication use may contribute to less emphasis by providers on diet and exercise counseling in ambulatory visits. Lastly, limitations in time during clinical encounters and lack of reimbursement for counseling may disincentivize providers to offer this service.[34]

The significant decline in counseling noted in 2012 may also be attributed to changes in the NAMCS data collection method, from a paper-based survey to an electronic data collection system. Specifically, the large decline seen in 2012 may suggest that, in years before 2012, there was over-reporting by providers on the provision of counseling or bias in recall and documentation, as providers may remember offering counseling but may not have documented this in patients' charts. As part of the quality control process for NAMCS, 2012 estimates for the variables published in the NAMCS annual web tables were compared to 2010 variables. National Center for Health Statistics staff conclude that they cannot definitively state whether these represent actual practice patterns or are related to the new sample design and methodology for data collection.[19] Thus, the findings from this study must be interpreted with caution given

this change. Notably, during 2012—2015, there was an upward trend in reported provision of counseling. This corresponds to the release of the U.S. Preventive Task Force recommendation in 2012 to provide or refer adults who are overweight or obese with at least 1 cardiovascular disease risk factor for behavioral counseling interventions.[15,35] However, given the nature of these data, only trends are reported, and this study design does not permit explaining the trends that are seen.

This study examined patient-, provider-, and practice-level characteristics associated with clinical counseling for diet and exercise. At the patient level, Hispanic patients were more likely to receive diet and exercise counseling. This is similar to findings from previous studies and may represent more awareness of the higher risk of diabetes and diabetes-related complications in ethnic minorities; however, it could also represent provider biases.[36—38] This study highlights the higher odds of patients with diabetes receiving counseling at visits with an APP or multiple types of providers. Several studies have demonstrated positive outcomes when APPs deliver lifestyle counseling.[39] These findings may suggest the strengths of team-based care in addressing chronic disease management recommendations.[40]

Limitations

The findings of this study should be examined in light of limitations of the NAMCS data. First, these findings were derived from serial, cross-sectional data that are reported retrospectively. Thus, provision of diet and lifestyle counseling over time may be underestimated, and multiple visits by the same patient cannot be ascertained. Furthermore, patients with prediabetes are known to strongly benefit from lifestyle change[6,7,41]; however, data on patients with prediabetes are not available in this data set. NAMCS only collected laboratory measures such as fasting glucose or HbA1c values from 2010 to 2014 and had large numbers of missing values (>70%). Also, they do not identify prediabetes as a diagnosis. Therefore, for the study period, visits for patients at risk of diabetes were identified based on other relevant provider-reported conditions (hypertension, hyperlipidemia, and obesity). Furthermore, the survey does not provide details on content, quality, or intensity of diet and exercise counseling. Moreover, NAMCS does not have data on patient characteristics, such as education levels and SES, or provider characteristics, such as sex, race/ethnicity, years in practice, and certain specialties including endocrinology (which is grouped in other specialties on the survey form). These may be important characteristics that warrant further study to examine group differences for the provision of diet and exercise counseling.

CONCLUSIONS

This study highlights that, nationally, a low proportion of patients with and at risk for diabetes received diet and exercise counseling from 2005 to 2015. Despite compelling evidence and national recommendations, there has been no increase in the trends in counseling over time during ambulatory visits for high-risk groups that may benefit. Moreover, the odds of receiving counseling vary by factors such as patient race and age, provider type, and region of visit location. Thus, the findings from this study suggest missed opportunities to offer counseling for patients with diabetes in ambulatory care settings. This study highlights an opportunity for improvement in the ambulatory setting and areas for further study to address variation in practice patterns at the patient, provider, and practice level to help close gaps in counseling in the ambulatory setting.

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SUPPLEMENTAL MATERIAL

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