

Disparities in Diabetic Foot Examinations: A Cross-Sectional Analysis of the Behavioral Risk Factor Surveillance System



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INTRODUCTION

Diabetes Mellitus (DM) is becoming increasingly prevalent in the US.¹ It often leads to serious health complications such as cardiovascular disease, peripheral neuropathy, foot ulcers, and amputations.^{2,3} Annual foot examinations by a medical professional are strongly recommended;⁴ however, many individuals do not get their feet checked.⁵

DM often causes poor mental health⁶ and poor physical health. As poor mental health is associated with a two-fold increase in foot ulcer incidence⁷ and individuals with diabetes often have many physical complications, we hypothesized that these factors would decrease motivation to utilize preventive services. Thus, we sought to identify how frequent poor mental health days, a depressive disorder diagnosis, frequent poor physical health days, and physical inactivity affect the likelihood of obtaining annual foot examinations by a healthcare professional.

METHODS

We performed a cross-sectional analysis of the 2021 Behavioral Risk Factor Surveillance System (BRFSS) datasets to determine the relationship between obtaining an annual foot examination by a healthcare professional and having frequent poor mental health days, a depressive disorder diagnosis, frequent poor physical health days, or physical inactivity. Using a bivariate regression model, we determined these associations using odds ratios (OR). We also controlled the model for age, sex, race/ethnicity, health insurance, level of education, current smoking status, and BMI.

RESULTS

As shown in Table 1, individuals who were less than 35 years of age were significantly less likely to obtain a foot examination, and less than half of those who were less than 25 got their feet checked. Additionally, females were less likely than males to get an annual exam. Individuals who were Hispanic, lacked insurance, were currently smoking cigarettes, did not complete high school, or had a BMI < 25 were also less likely to obtain an annual foot examination by a healthcare professional.

Individuals with diabetes who reported frequent poor mental health days got less annual foot examinations (72.06%) compared to those without frequent poor mental health days (76.38%) – a statistically significant association. Of those who reported a sedentary lifestyle with no physical activity, 73.15% had their feet checked. This is compared with those who led an active lifestyle where 77.07% had a foot exam. This was also statistically significant.

Although our results show fewer foot checks for individuals with a depressive disorder diagnosis and those reporting frequent poor physical health days, these results were not statistically significant.

CLINICAL IMPLICATIONS

Due to these results and the clinical risks associated with the development of a foot ulcer, we recommend implementation of further preventative health services for individuals with diabetes who report frequent poor mental health and a sedentary lifestyle. These may include increased mental health screenings, the option for counseling or support groups, or an integration of mental/behavioral health services in diabetes care. Additionally, we recommend education on exercise methods and implementation of exercise groups or programs that are specifically designed for individuals with diabetes.

Table 1. Annual foot examinations among various demographics (n = 21372; N = 12757834).

	Foot check by HCP			X ² , P
	Total n (%)	Yes n (%)	No n (%)	
Overall	21372 (100)	16121 (75.54)	5251 (24.46)	
age group				
18-24	83 (0.51)	43 (42.81)	40 (57.19)	14.97, < .0001
25-34	373 (2.12)	232 (59.5)	141 (40.5)	
35-44	1059 (6.15)	705 (66.07)	354 (33.93)	
45-54	2670 (15.10)	1935 (72.96)	735 (27.04)	
55-64	5121 (25.12)	3855 (75.49)	1266 (24.51)	
65+	12066 (51.00)	9351 (78.46)	2715 (21.54)	
sex				
Male	10543 (50.29)	8126 (76.82)	2417 (23.18)	6.22, .013
Female	10829 (49.71)	7995 (74.24)	2834 (25.76)	
race				
White	15461 (68.28)	11794 (76.34)	3667 (23.66)	7.91, < .0001
Black	2511 (14.92)	1967 (79.51)	544 (20.49)	
Asian	260 (1.52)	169 (70.04)	91 (29.96)	
AI/AN	694 (1.45)	497 (73.1)	197 (26.9)	
Hispanic	1737 (11.17)	1196 (67.56)	541 (32.44)	
Other	709 (2.67)	498 (70.55)	211 (29.45)	
insurance				
Yes	20016 (95.32)	15257 (76.79)	4759 (23.21)	51.24, < .0001
No	641 (4.68)	350 (53.75)	291 (46.25)	
educag				
< HS	1835 (9.91)	1266 (69.29)	569 (30.71)	12.24, < .001
HS	6340 (29.01)	4770 (74.83)	1570 (25.17)	
Some College	6545 (29.86)	4997 (76.85)	1548 (23.15)	
College Graduate	6573 (31.23)	5033 (76.87)	1540 (23.13)	
smoke				
No	17934 (87.39)	13666 (76.2)	4268 (23.8)	12.24, < .001
Yes	2530 (12.61)	1776 (70.82)	754 (29.18)	
Ovrwt or obese				
No	2711 (13.76)	1990 (71.08)	721 (28.92)	8.90, .003
Yes	16762 (86.24)	12749 (76.33)	4013 (23.67)	

Table 2. Reception of annual foot examination among individuals with diabetes based on mental and physical health variables with the likelihood of *not* having feet checked.

	Foot Check in the past 12 months			Logistic Regression	
	Total n (%)	Yes n (%)	No n (%)	OR (95%CI)	AOR (95%CI)
Depressive disorder					
No	16093 (74.85)	12239 (76.42)	3854 (23.58)	1 (Ref)	1 (Ref)
Yes	5177 (25.15)	3803 (72.93)	1374 (27.07)	1.2 (1.07-1.35)	1.13 (0.98-1.30)
Frequent poor mental health days					
No	17822 (84.25)	13599 (76.38)	4223 (23.62)	1 (Ref)	1 (Ref)
Yes	3147 (15.75)	2238 (72.06)	909 (27.94)	1.25 (1.09-1.44)	1.21 (1.03-1.43)
Sedentary					
No	12938 (61.29)	9952 (77.07)	2986 (22.93)	1 (Ref)	1 (Ref)
Yes	8370 (38.71)	6122 (73.15)	2248 (26.85)	1.23 (1.1-1.38)	1.31 (1.14-1.49)
Frequent poor physical health days					
No	15691 (75.08)	11899 (76.04)	3792 (23.96)	1 (Ref)	1 (Ref)
Yes	5042 (24.92)	3767 (74.85)	1275 (25.15)	1.07 (0.94-1.21)	1.08 (0.94-1.25)

CONCLUSION

Our results showed that individuals who reported frequent poor mental health days or a sedentary lifestyle were statistically less likely to get an annual foot examination by a healthcare professional. This is likely due to decreased motivation for self-care in individuals with poor mental health or a sedentary lifestyle. It is important to highlight groups of individuals with diabetes who are at a greater risk for development of foot ulceration to prevent serious complications such as amputations. Interventions such as counseling, support groups, increased mental health screenings, exercise classes, and educational materials may improve utilization of preventive services among individuals with diabetes. Thus, annual foot examinations will be increased, and foot ulcer development and subsequent amputations may be prevented.

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