BURDEN OF ILLNESS ASSOCIATED WITH SYMPTOMS OF DIABETIC PERIPHERAL NEUROPATHY AND DIABETIC RETINOPATHY

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ABSTRACT

OBJECTIVES: To evaluate the effect of symptoms characteristic of diabetic peripheral neuropathy (SDPN). diabetic retinopathy (DR) and co-morbid SDPN & DR (COMORB) among US adults =40 years old with diagnosed diabetes on several burden of illness (BOI) measures, including indirect costs and healthcare utilization, using the combined 1999-2000 and 2001-2002 National Health and Nutrition Examination Surveys (NHANES).

METHODS: Included in the analysis were 850 NHANES respondents =40 years old classified as having diagnosed diabetes. Logistic regression models were used to assess the effect of SDPN. DR and COMORB on BOI. Model covariates included age, gender, race, education, insurance status, current smoking status, currently asthmatic, and history of cardiovascular disease, cancer, arthritis, COPD, hypertension and stroke. The conditions of interest were assessed based upon respondent self-report.

RESULTS: Using the combined 1999-2000 and 2001-2002 NHANES, it was estimated that, among US adults aged =40 years old with diagnosed diabetes, those with SDPN (OR = 2.27; 95%CI = 1.34, 3.85), DR (1.67; 1.08, 2.59) and COMORB (2.88; 1.28, 6.48) were each more likely to have 4 or more healthcare visits in the past year than those without the corresponding condition. Those with DR (1.81; 1.31, 2.50) and COMORB (2.07; 1.13, 3.77) were both more likely to have had at least one overnight hospital stay in the past year. Finally, those of working age (40-65) with SDPN (3.31; 1.64, 6.64), DR (2.99; 1.47, 6.08) and COMORB (4.40; 2.22, 8.74) were each more likely to be unable to work due to physical limitations.

CONCLUSION: Among US adults aged =40 years old with diagnosed diabetes, SDPN, DR, and COMORB all appear to significantly increase BOI. Future therapies that offer relief of both of these conditions may have significant benefits on direct measures of healthcare resource utilization and indirect costs (such as lost work time).

Introduction

Despite the development of comprehensive diabetes management programs over the past 2 decades, many patients with diabetes continue to be at an increased risk for diabetic microvascular complications such as diabetic peripheral neuropathy (DPN) and diabetic retiropathy (DR). DPN and DR are significant problems that negatively impact the quality of life of diabetes patients. Moreover, significant healthcare resources are spent each year to treat these conditions, both for active symptoms and for late-stage complications including uclers and amountainos.

Although often diagnosed and treated separately, DPN and DR are pathologically linked. Previous research (Dyck et al., 1999, for example) has identified three lines of evidence suggesting that DPN and DR have a similar metabolic genesis: 1) DPN and DR are statistically associated; 2) microvascular changes are histologically and functionally similar in vessels taken from areas affected by either condition; and 3) prospective studies evaluating improved hyperglycemic control results in a similar preventive effect on both conditions.

Objective

The objective of this study was to estimate the prevalence and associate burden of illness of symptoms characteristic of diabetic peripheral neuropathy (SDPN) and diabetic retinopathy (DR) among US adults aged 40 and older with diagneed diabetic.

Data Sources

NHANES is a nationally representative, periodic survey of the non-institutionalized US civilian opoliation, and is administered by the National Center for Health Statistics of the Centers tor Disease Control and Prevention (CDC), NHANES staff conduct interviews and perform physical examinations on participants. Respondents are interviewed in Phetri homes to obtain information undergo a physical examination in a mobile examination center. The procedures used to select the sample and to conduct the interview and examination have been described in great detail in the literature (CDC, 2002).

For this study, we analyzed the combined NHANES 1999-2000 and 2001-2002

Methods

In this study, we analyzed NHANES data to assess differences in the rate at which patients with and without SDPN, DR and comorbid SDPN and DR consume healthcare resources (e.g., visit their healthcare provider, spend the night in a hospital). For example, we examined whether or not those with comorbid SDPN and DR are more likely to have 4 or more healthcare visits in the past year than

Analyses were conducted using SAS for Windows statistical software (Version 8.2). Final results vriayses were conducted using SAS tot 'winnows' statistical somware (version 2.2.) - irliar tesu included both unweighted and weighted (e.g., nationally representative) estimates. Following (al. (2004), we did not undertake any form of imputation to account for missing data. Using the sampling weights provided with the NHANES releases, we were able to generate nationally

We supplemented demographic information with data from the Diabetes questionnaire. Respondents We support and a second graph is individually full and that the met second second decision and the second secon

From the original NHANES sample of adults 40 years of age and older, we excluded respondents for the following reasons: ~Did not complete the exam and therefore would not have certain key information (e.g., monofilament testing results, plasma glucose), and ~Were not part of the Peripheral Neuropathy Section of the Lower Extremity Disease examination. Persons are excluded from this exam if they are younger than 40 years of age, have bilateral amountarions or weich over 400 nounds.

amputations, or weigh over 400 pounds.

Diabetes-related Variables

We classified a respondent as having been diagnosed with diabetes if: • He or she answered yes to the question "Doctor told you have diabetes?", or • He or she reports currently taking insulin or diabetic pills for diabetes.

We classified a respondent as having SDPN if: • He or she reports numbness, loss of feeling, or painful sensations or feeling in their feet.

We classified a respondent as having DR if: • He or she answered yes to the question "Has diabetes affected your eyes/do you have retinopathy?" We classified a respondent as having comorbid SDPN and DR if they were classified as having both conditions, as defined above.

Burden of Illness Variables

Number of healthcare visits in the past 12 months: We assessed the number of times a respondent reported visiting a healthcare provider during the past 12 months using response to the question "During the past 12 months, how many times have you seen a doctor or other health care professional about your health at a doctor's office, a clinic, hospital emergency room, at home or some other place? Do not include times hospitalized overnight."

Mental health visit in the past 12 months: We classified a respondent as having visited a mental health professional in the past 12 months if s/he responded positively to the question "During the past 12 months, have you seen or talked to a mental health professional such as a psychologist, psychiatrist, psychiatric nurse or clinical social worker about your health?

Overnight hospital stay in the past 12 months: We classified a respondent as having had an (any) overnight hospital stay in the past 12 months if s/he responded positively to the question "During the past 12 months, were you a patient in a hospital overnight? Do not include an overnight stay in the emergency room."

Number of overlight hospital stays in the past 12 months: We assessed the number of times a respondent reported having an overnight hospital stay in the past 12 months using response to the question "During the past 12 months, how many times were you an overnight hospital patient?" Number of prescription medicines reported: We assessed the number of prescription medicines a

Number of prescription meaches reported: we assessed the number of prescription meaches a respondent reported taking using the variable. Inability to work: We classified a respondent as being unable to work due to a health concern if s/he responded positively to the question "Does a physical, mental or emotional problem now keep you from working at a job or business?"

Turnie dability to work: We classified a respondent as being limited in his or her ability to work due to a health concern if s/he responded positively to the question "Are you limited in the kind or amount of work you can do because of a physical, mental or remotional problem?"

In addition, we created a number of variables to describe the burden of illness which were based upon the previously described variables. These new measures included dichotomous terms for: • Had 3 or more overnight hospital stays in past year?

Had 4 or more healthcare visits in past year?

Models Estimated

Jsing Stata's SVYREG command, which adjusts for NHANES' complex survey design, we estimated ordinary least squares regression models of the general form:

$\mathsf{BOI}_{c} = \mathsf{B}_{0} + \mathsf{B}_{i}\mathsf{COND}_{i} + \mathsf{B}_{i}\mathsf{X}_{i} + \mathsf{e},$

where BOI, is a continuous burden of illness outcome (e.g., number of prescription medications currently being taken), COND is a condition indicator (SDPN, DR, or comorbid SDPN and DR). X is a vector of explanatory variables, and e is the error term.

Explanatory variables included: age, gender, race (non-white is the reference category), current smoker status, education (high school graduate and above is the reference category), self-reported cardiovascular disease, charditis, chronic obstructive pulmonary disease, hypertension, stroke, currently asthmatic, and insurance status (no insurance is the reference category). Using Stata's SV1LOGIT command, which adjusts for NHANES' complex survey design, we estimated logistic regression models of the general form:

$BOI_d = B_0 + B_i COND_i + B_i X_i + e_i$

where BOI, is a dichotomous outcome of interest (e.g., had at least one mental health visit in the past 12 months or had at least one overnight hospital stay in the past 12 months), COND is a condition indicator (SDPN, DR, or comorbid SDPN and DR), X is a vector of explanatory variables, and e is the error term.

Explanatory variables included: age, gender, race (non-white is the reference category), current smoker status, education (high school graduate and above is the reference category), self-reported cardiovascular disease, cancer, arthritis, chronic obstructive pulmonary disease, hypertension, stroke, currently asthmatic, and insurance status (no insurance is the reference category).

In addition, using the same vector of explanatory variables listed above, we used Stata's SVYMLOGIT command, which adjusts for NHANES' complex survey design, to estimate multinomial logit regression models to estimate the number of overnight hospital stays, as well as the number of healthcare visits in the past 12 months. As recorded in NHANES, these variables are not strictly continuous (i.e., 0, 1, 2-3, 4-9, 10-12, and 13 or more for the number of healthcare visits in the past 12 months)







Results

Distribution of Demographic Factors

	SYMPTOMS OF DPN (SDPN)?							
	NO				YES			
	UNWEIGHTE	WEIGHTED	WEIGHTED	WEIGHTED	UNWEIGHTE	WEIGHTED	WEIGHTED	WEIGHTED
AGE CATEGODY	Dn	N	% (COL)	% (ROW)	Dn	N	% (COL)	% (ROW)
AGE CATEGORI	-							
40-49	74	1,678,110	20.92	77.69	35.00	481,834	12.39	22.31
.20-29	92	1,853,345	23.10	63.07	51.00	1,084,987	27.90	36.93
60-69	196	2,111,564	26.32	61.63	107.00	1,314,472	33.81	38.37
70-79	127	1,535,638	19.14	66.1	70.00	787,483	20.25	33.90
80+	72	842,909	10.51	79.35	26.00	219,390	5.64	20.65
GENDER	_							
MALE	291	4.131.687	51.51	69.05	140.00	1.852.163	47.64	30.95
FEMALE	270	3,889,879	48.49	65.64	149.00	2,036,004	52.36	34.36
ELDERLY?	-							
ELDERLY (>=65)	- 266	4 501 088	57.25	67.61	145.00	2 100 016	56 58	37 39
NON-ELDERLY (<65)	295	3,429,578	42.75	67.01	144.00	1,688,251	43.42	32.99
RACE/ETHNICITY	-							
NON-HISPANIC WHITE	207	5 113 001	63 75	68.26	99.00	2 378 353	61.17	31.74
NON-HISPANIC BLACK	139	1,152,171	14.36	61.61	77.00	717,884	18.46	38.39
MEXICAN AMERICAN	163	541,823	6.75	66.91	87.00	267,985	6.89	33.09
OTHER RACE, INCLUDING MULTI-RACIAL	17	465,665	5.81	71.19	8.00	188,476	4.85	28.81
OTHER HISPANIC	35	747,917	9.32	69.04	18.00	335,469	8.63	30.96
LESS THAN HIGH SCHOOL EDUCATION	_							
NO	265	4,968,167	61.94	66.78	138.00	2,471,744	63.57	33.22
YES	296	3,053,399	38.06	68.31	151.00	1,416,422	36.43	31.69
ANY INSURANCE COVERAGE?								
NO	63	664,523	8.28	55.14	49.00	540,724	13.91	44.86
YES	498	7,357,043	91.72	68.73	240.00	3,347,442	86.09	31.27
TOTAL	561	8,021,566	100.00	67.35	289.00	3,888,166	100.00	32.65

	DIADETTE RETITIONATION								
	NO					YES			
	UNWEIGHTE D n	WEIGHTED N	WEIGHTED % (COL)	WEIGHTED % (ROW)	UNWEIGHTE D n	WEIGHTED N	WEIGHTED % (COL)	WEIGHTED % (ROW)	
AGE CATEGORY	_								
40-49	76	1,628,292	18.83	75.39	33.00	531,652	16.30	24.61	
50-59	109	2,212,006	25.58	75.28	34.00	726,325	22.27	24.72	
60-69	209	2,340,345	27.06	68.31	94.00	1,085,691	33.28	31.69	
70-79	128	1,658,843	19.18	71.41	69.00	664,278	20.36	28.59	
80+	76	808,341	9.35	76.09	22.00	253,958	7.79	23.91	
GENDER	-								
MALE	303	4,470,815	51.70	74.71	128.00	1,513,034	46.38	25.29	
FEMALE	295	4,177,013	48.30	70.49	124.00	1,748,870	53.62	29.51	
ELDERLY?	-								
ELDERLY (>=65)	295	5.074.259	58.68	74.71	116.00	1.717.645	52.66	25.29	
NON-ELDERLY (<65)	303	3,573,569	41.32	69.83	136.00	1,544,259	47.34	30.17	
RACE/ETHNICITY	-								
NON-HISPANIC WHITE	233	5.736.303	66.33	76.56	73.00	1.756.041	53.83	23.44	
NON-HISPANIC BLACK	142	1,235,153	14.28	66.05	74.00	634,901	19.46	33.95	
MEXICAN AMERICAN	170	566,503	6.55	69.96	80.00	243,305	7.46	30.04	
OTHER RACE, INCLUDING MULTI-RACIAL	15	400,632	4.63	61.25	10.00	253,509	7.77	38.75	
OTHER HISPANIC	38	709,237	8.20	65.46	15.00	374,149	11.47	34.54	
LESS THAN HIGH SCHOOL EDUCATION	_								
NO	295	5,508,895	63.70	74.05	108.00	1,931,016	59.20	25.95	
YES	303	3,138,933	36.30	70.23	144.00	1,330,888	40.80	29.77	
ANY INSURANCE COVERAGE?									
NO	85	971,105	11.23	80.57	27.00	234,142	7.18	19.43	
YES	513	7,676,723	88.77	71.72	225.00	3,027,762	92.82	28.28	
TOTAL	598	8 647 828	100.00	72.61	252.00	3 261 904	100.00	27.30	

	CO-MORBID DR AND SDPN							
	NO YES							
	UNWEIGHTED	WEIGHTED N	WEIGHTED %	WEIGHTED % (ROW)	UNWEIGHTED	WEIGHTED N	WEIGHTED %	WEIGHTED %
AGE CATEGORY			(000)	((000)	(
40-49	93	1,953,791	18.88	90.46	16.00	206,154	13.22	9.54
50-59	125	2,591,383	25.04	88.19	18.00	346,948	22.24	11.81
'60-69	255	2,795,679	27.01	81.6	48.00	630,356	40.42	18.40
'70-79	162	2,007,264	19.39	86.4	35.00	315,857	20.25	13.60
'80+	91	1,001,910	9.68	94.32	7.00	60,389	3.87	5.68
GENDER	-							
MALE	370	5.291.051	51.12	88.42	61.00	692 799	44.47	11.58
FEMALE	356	5,058,977	48.88	85.37	63.00	866,906	55.58	14.63
ELDERLY?	-							
ELDERLY (>=65)	250	E 000 06E	E7.06	00.22	61.00	702.020	E0 84	11.67
NON-ELDERLY (<65)	376	4,351,063	42.04	85.02	63.00	766,766	49.16	14.98
RACE/ETHNICITY	_							
NON-HISPANIC WHITE	272	6 680 320	64 54	89.16	34.00	812.015	52.06	10.84
NON-HISPANIC BLACK	177	1,521,149	14.70	81.34	39.00	348,905	22.37	18.66
MEXICAN AMERICAN	211	694,772	6.71	85.79	39.00	115.036	7.38	14.21
OTHER RACE, INCLUDING MULTI- RACIAL	21	544,494	5.26	83.24	4.00	109,647	7.03	16.76
OTHER HISPANIC	45	909,285	8.79	83.93	8.00	174101	11.16	16.07
LESS THAN HIGH SCHOOL EDUCATION	_							
NO	350	6,521,297	63.01	87.65	53.00	918,614	58.90	12.35
YES	376	3,828,731	36.99	85.66	71.00	641,090	41.10	14.34
ANY INSURANCE COVERAGE?	_							
NO	94	1,031,879	9.97	85.62	18.00	173,368	11.12	14.38
YES	632	9,318,149	90.03	87.05	106.00	1,386,336	88.88	12.95
TOTAL	726	10,350,028	100.00	86.9	124.00	1,559,704	100.00	13.10
Outcome Modeled	Мо	delir	ng E	stim	ates	terest ^{1, 2} Odd	is Ratio ³ 95% (Conf
								_
Unable to work due to physical lin	nitations*				SDPN"		3.31 1.64	
					Comorbid SDP	N and DR"	4.40 2.22	
					Comor Bid Sort			
At least 1 overnight hospital stay	in past year				SDPN		1.45 0.80	
					Retinopathy"		1.81 1.31	
					Comorbid SDP	N and DR	2.07 1.13	1
Had 4 or more healthcare visits in	past year				SDPN''		2.27 1.34	
					Retinopathy"		1.67 1.08	1
					Comorbid SDP	N and DR	2.88 1.28	ı
Virited a mental health profession	al in part year				CDDN		1.69 0.00	
vanual a mentar realur profession	ur in past year				Retinopathy		1.51 0.90	
					Comorbid SDP	N and DR	1.90 1.03	

Number of overnight hospital stays in past year ^{6, 7}	⁷ 1 overnight stay vs. 0 over
	1 overnight stay vs. 0 over
	1 overnight stay vs. 0 over
	2 overnight stays vs. 0 over
	2 overnight stays vs. 0 over
	2 overnight stays vs. 0 ove
	6+ overnight stays vs. 0 o
	6+ overnight stays vs. 0 or
	6+ overnight stays vs. 0 o
Number of healthcare visits in past year ^{9, 10}	1 visit vs. 0 visits ¹¹
	1 visit vs. 0 visits ¹¹
	1 visit vs. 0 visits ¹¹
	10-12 visits vs. 0 visits ¹¹
	10-12 visits vs. 0 visits ¹¹
	10-12 visits vs. 0 visits ¹¹
	13+ visits vs. 0 visits ¹¹
	13+ visits vs. 0 visits ¹¹
	13+ visits vs. 0 visits ¹¹

* Significant at the 95% level

SOURCE: 1999-2002 National Health and Nutrition Examination Survey (NHANE Each row in this table represents a distint model. Separate models for SDPN, DR, and comorbid SDPN and DR were estimated for each "Exploratory variables included: age, gender, race (non-while is the reference category), current anoker status, education (high sch the reference category), service reference category). Current anoker status, education (high sch the reference category), service reference category). Current anoker status, education (high sch category), service reference category). Service reference category). Estimated using Stata's SVYLOGIT command, which accounts for NHANES's complex survey design. ⁴ Among those of working age (less than 66 years of age).

Comparative G

timated using Stata's SVVMI OGIT command, which accounts for NHANES's complex support desir Multinomial logit estimates are relative to the base category, in this case no overnight hospital stays in past year This measure is not purely continuous; rather, the upper range is truncated at 6 or more overnight hospital stays per year ⁸ The full multinomial logit models included categories for 0 overnight hospital stays 1 overnight hospital stay, 2 overnight hospital stays, 3 overnight hospital stays stays, 4 overnight hospital stays, 5 overnight hospital stays, and 6+ overnight hospital stays; only significant categories are presented here Multinomial logit estimates are relative to the base category, in this case no healthcare visits in past year This measure is not purely continuous; rather, the upper range is truncated at 13 or more visits per yea The full multinomial logit models included categories for 0 visits, 1 visit, 2-3 visits, 4-9 visits, 10-12 visits, and 13 visits; only significant categories an presented here.

12 Estimated using Stata's SVYREG command, which accounts for NHANES's complex survey design

NO	63	664,523	8.28	55.14	49.00
YES	498	7,357,043	91.72	68.73	240.00
TOTAL	561	8,021,566	100.00	67.35	289.00
				DIABETIC RE	TINOPAT
		N	0		
	UNWEIGHTE	WEIGHTED	WEIGHTED	WEIGHTED	UNWEIGH
AGE CATEGORY	UNWEIGHTE D n	WEIGHTED N	WEIGHTED % (COL)	WEIGHTED % (ROW)	UNWEIGH D n
AGE CATEGORY 40-49	UNWEIGHTE D n 76	WEIGHTED N 1,628,292	WEIGHTED % (COL) 18.83	WEIGHTED % (ROW) 75.39	UNWEIGH D n 33.00
AGE CATEGORY 40-49 50-59	UNWEIGHTE D n 76 109	WEIGHTED N 1,628,292 2,212,006	WEIGHTED % (COL) 18.83 25.58	WEIGHTED % (ROW) 75.39 75.28	UNWEIGH D n 33.00 34.00

Distribution of Demographic Factors (cont.)

-	Parameter of Interest ^{1, 2}	Odds Ratio ³	95% Conf
	SDPN"	3.31	1.64
	Retinopathy"	2.99	1.47
	Comorbid SDPN and DR"	4.40	2.22
	0000		0.00
	SUPN	1.45	0.80
	Retinopathy	1.81	1.31
	Comorbid SDPN and DR	2.07	1.13
	SDPN"	2.27	1.34
	Retinopathy	1.67	1.08
	Comorbid SDPN and DR	2.88	1.28
	SDPN	1.68	0.90
	Retinopathy	1.51	0.74
	Comorbid SDPN and DR*	1.90	1.03
		Deletive Diele	
oups	Parameter of Interest ^{1, 2}	Ratio ⁵	95% Conf
night stays ⁸	SDPN	1.28	0.61
night stays ⁸	Retinopathy"	1.93	1.20
night stays ⁰	Comorbid SDPN and DR	2.13	0.98
rnight stays ⁶	SDPN	1.61	0.56
rnight stays ⁶	Retinopathy	1.65	0.91
rnight stays ⁶	Comorbid SDPN and DR	2.50	1.10
ernight stays ⁸	SDPN	7.70	1.51
ernight stays ⁶	Retinopathy	0.38	0.04
vernight stavs [®]	Comorbid SDPN and DR	0.78	0.05
, .			
	SDPN	0.50	0.14
	Retinopathy"	6.15	1.84
	Comorbid SDPN and DR	1.24	0.16
	SUDDA	1.57	0.47
	Patinonathy"	4.73	1.31
	Comorbid SDPN and DR	3.60	0.67
		2.30	
	SDPN	2.69	0.92
	Retinopathy	3.82	1.07
	Comorbid SDPN and DR	3.44	0.82
		Parameter	
	Parameter of Interest ^{1, 2}	Estimate ¹²	95% Co

Parameter of Interest ^{1, 2}	Estimate ¹²	95% Cont	
SDPN	0.75	-0.24	
Retinopathy"	1.52	0.88	
Comorbid SDPN and DR"	1.98	1.00	
** Significant at the 99% level.			

Discussion

Using the 1999-2002 NHANES, we estimated that 11.9 million adults =40 have been diagnosed with

Of these, nearly 3.9 million have SDPN, 3.3 million have DR, and 1.6 million have comorbid SDPN and DR (COMORE)

Among those with SDPN, the mean age was 62.5, 56.6% were <65 years old, 61.2% was non-Hispanic white, and 52.4% was female. 36.4% had less than a high school education, and 86.1% had some form of health insurance.

Among those with DR, the mean age was 62.7, 52.7% were ≺65 years old, 53.8% was non-Hispan white, and 53.6% was female. 40.8% had less than a high school education, and 92.8% had some form of health insurance.

Among those with comorbid SDPN and DR, the mean age was 63.1, 50.8% were <65 years old, 52.1% was non-Hispanic white, and 55.6% was female. 41.1% had less than a high school education and 88.9% had some form of health insurance.

Using the combined 1999-2000 and 2001-2002 NHANES, it was estimated that, among US adults aged =40 years old with diagnosed diabetes, those with SDPN (OR = 2.27; 95%CI = 1.34, 3.85), CI = 7.34, 3.85), CI = 7.34, 3.85,

Multinomial logit models suggest that those with DR are more likely to have 1 overnight hospital stay versus 0 overnight hospital stays in the past year (RRR: 1.93; 95% CI: 1.20, 3.12) than those without DR; those with COMORB are more likely to have 2 overnight hospital stays versus 0 overnight hospital stays (2.50; 1.10, 5.66) than those without COMORB; finally, those with SDPN are more likely to have 6 or more overnight hospital stay versus 0 overnight hospital stays (7.70; 1.51, 39.32) than those without SDPN.

Additionally, multinomial logit models suggest that those with DR are more likely to have 1 healthcare visit versus 0 healthcare visits in the past year (6.15; 1.84, 20.60), 10-12 healthcare visits versus 0 healthcare visits in the past year (4.73; 1.31, 17.07), and 13+ healthcare visit versus 0 healthcare visits in the past year (3.82; 1.07, 13.63) than those without DR.

Those with DR, and comorbid DR and SDPN each report using significantly more prescription medications, 1.52 and 1.98 respectively, than those without the conditions.

Limitations

Unfortunately, NHANES 1999-2000 does not contain much information on DR. For this study, we were limited to one question in the diabetes questionnaire which asks whether or not the respondent was ever told by a doctor that diabetes has affected her/his eyes or that s/he had retinopathy. As is evident, this measure is not clinical in nature, and thus we were not able to stage this definition of evident.

All definitions were based upon respondent self-report, and as such, may be subject to response bias

Conclusions

Prevalence estimates presented here suggest that novel therapies that can be used to provide relief o SDPN and DR may address a substantial unmet medical need among patients with these conditions.

Further, BoI results suggest that a therapy of this sort may present a potential cost offset by reducing the estimated impact of SDPN and DR on healthcare utilization.

Acknowledgements

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