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Prevalence of Colorectal Cancer Screening among a Multimorbid Rural Appalachian Population

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Abstract

Objectives—The purpose of this study was to determine the relation among multiple morbidities and the prevalence of colorectal cancer (CRC) screening among older adult Appalachian residents of Kentucky. This is the first known study to address multiple morbidities exclusively with a health-disparities population.

Methods—This was a cross-sectional study of 1153 subjects, aged 50 to 76 years, from Appalachian Kentucky.

Results—White race, post–high school education, and perception of having more than enough income on which to survive were associated with higher rates of any guideline concordant CRC screening. Statistically significant trends in the outcome of adjusted odds ratios for colonoscopy with greater number of morbidities ($P < 0.05$) were noted; the higher number of morbidities, the higher rates of screening.

Conclusions—Contrary to much existing research, within a health-disparities population, we found a dose-response relation between comorbidities and greater likelihood of CRC screening. Future research in this area should focus on explanations for this seldom-described finding. In addition, this finding has meaningful clinical and behavioral implications, including ensuring provider screening recommendation during routine office visits and outreach, perhaps through community clinics and public health departments, to extremely vulnerable populations lacking access to preventive care.

Keywords

colorectal cancer; screening; multimorbidity; epidemiology

By 2020, more than 1 in 6 people in the United States will be 65 years old or older,[1] and 81 million of them likely will be diagnosed as having multiple morbidities (MMs).[2] Rates of MMs are especially high in rural areas, such as Appalachian Kentucky, where residents tend to be older, poorer, less educated, and more likely to be uninsured than their urban counterparts.[3–6] Moreover, these residents are more likely to have risk factors, such as smoking and obesity, that elevate their mortality rates compared with residents in the rest of

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the state and the nation.[7–11] Scant research exists on how one of the nation's most vulnerable populations balances MMs and preventive care.

Self-care practices for chronic diseases often take extensive time and resources,[12,13] involving alterations in diet, exercise, and medications, and extensive interaction with formal health care.[14–16] Although most (95%) primary care physicians recommend CRC screening for colorectal cancer (CRC),[17] management of MMs may make such recommendations a low priority for both patients and providers.[18–20] Patients with MMs must maintain complex, costly, and time-consuming regimens; thus management of MMs may represent a "competing demand" for the provider and the patient.[21] Physicians may be disinclined to recommend screening to patients whom they consider physically unable to endure such screening.[22] People with MMs, in general, have more contact with healthcare providers than do healthier individuals, and more opportunity to receive a screening recommendation.[23–25] Although the preponderance of research confirms that competing demands tend to reduce the likelihood of screening, the jury is still out regarding whether MMs will increase or decrease the likelihood of screening, particularly in the populations that are most likely to experience MMs and inadequate cancer screening.

This article describes a cross-sectional study of the association between MMs among older adults in Appalachian Kentucky and the prevalence of CRC screening.[26] To our knowledge, this is the first study conducted exclusively in a rural, health-disparities population. In addition, the burgeoning older adult population, the escalating rate of MMs, particularly among vulnerable populations, and the unresolved relation between management of MMs and preventive care enhance the innovation and significance of this focus.

The objectives of our study were to determine the relation between MMs and the prevalence of CRC screening by residents of the Appalachian region of Kentucky ages 50 to 76 years and to provide insight about why this relation exists and what it may mean for cancer-control efforts, research, policy, and clinical practice.

Methods

After receiving approval from the institutional review board, the University of Kentucky Survey Research Center administered a survey from November 2009 to April 2010 to residents of the Appalachian region of Kentucky between 50 and 76 years old (the recommended start and end ages for CRC screening, according to the American Cancer Society and the US Preventive Services Task Force).[27,28] The survey was conducted by trained interviewers using landline telephones to call households selected by a modified list-assisted Mitofsky-Waksberg random-digit dialing procedure,[29] which ensured that every residential telephone line in Appalachian Kentucky had an equal probability of being selected. Up to 15 attempts were made for each number in the sample and up to 10 scheduled callbacks, if respondents indicated that the timing of the call was "inconvenient." The survey resulted in 1230 completed interviews from a total of 8019, with 3611 refusals and 3178 ruled ineligible (many respondents' ages were outside the 50–76 bracketA). The Council of American Survey Research Organization response rate was 55%. Of the 1230 interviews, 77 subjects were ruled ineligible for county residence outside Appalachian Kentucky or had a diagnosis of CRC.

[A]AU: If this was not the only reason they were ruled ineligible, pls add "for example,".

Measures

The survey consisted of 4 sets of questions designed to obtain information on demographic characteristics; the presence of 15 different comorbidities such as heart disease, diabetes, stroke, and various types of cancer; adherence to CRC screening guidelines; and barriers to and facilitators of CRC screening behavior.

The primary outcomes of interest were guideline-concordant CRC screening modalities based on whether and how long ago subjects had received one or more of the four types of CRC screening modalities. We defined guideline-concordant screening as having fecal occult blood testing, colonoscopy, flexible sigmoidoscopy, or double-contrast barium enema within the timeline recommended for asymptomatic people by the US Preventive Services Task Force and the American Cancer Society (ie, annually for fecal occult blood testing, every 10 years for colonoscopy, and every 5 years for flexible sigmoidoscopy[30] and double-contrast barium enema[31]). The tests were described to respondents in an easily understood sentence, and we did not distinguish between screening and diagnostic tests. We used the responses to create covariates for sociodemographic and economic characteristics, and the presence of 15 specific chronic conditions that we chose based upon the findings from the exploratory phase of the study, which involved in-depth interviews and focus groups.[32] We supplemented the questions regarding whether respondents had ever been told by a doctor or other health professional that they had 1 of the 15 chronic conditions by the open-ended question, “Other than these diseases, has a doctor ever told you that you have any other chronic or long-term diseases?” We used clinical judgment to map responses to this question into 1 of the 15 chronic conditions, or the category “other” morbidities. We created a covariate capturing the number of morbidities as the sum of the 15 specific chronic conditions and “other” (ie, additional) morbidities.

Data Analyses

We performed descriptive analyses of participants’ responses to questions on sociodemographic characteristics, presence of 15 specific morbidities and “other” chronic conditions, and prevalence of either colonscopy or any guideline-concordant CRC screening. To determine whether our sample was representative of the residents of Appalachian Kentucky and to compare our sociodemographic sample composition with that of Kentucky overall, we extracted data for Kentucky from the public version of the Behavioral Risk Factor Surveillance System 2009[33] and obtained weighted estimates of the sociodemographic characteristics of the state and Appalachian Kentucky residents. We created a dummy variable for Appalachian residence by matching the Federal Information Processing Standard codes in the Behavioral Risk Factor Surveillance System to the Appalachian Regional Commission listing of counties in Appalachia.[34]

Bivariate analyses allowed us to examine the associations between either colonoscopy or any guideline-concordant CRC screening and the covariates representing sample characteristics, 15 specific chronic conditions, and number of morbidities. We analyzed the associations between the categorical variables (χ^2 and Fisher exact tests) or age as a continuous variable (two independent samples or unpaired *t* tests). We confirmed the test for equal variances using the Bartlett χ^2 test ($P > .05$). We stratified the bivariate analyses based on whether participants were diagnosed as having a gastrointestinal (GI) disease, including ulcers, heartburn, chronic bowel problems, or liver disease because such subjects may be more likely to be referred for CRC screening because of the presence of these GI diseases. We used tests of homogeneity and trend to examine the dose-response relation between number of morbidities and each of the screening modalities.

We conducted two sets of multivariable logistic regressions to examine the relations between MMs and either colonoscopy or any CRC screening. With the first set, MMs were measured by separate covariates for each of the 15 morbidities; with the second set, we modeled MMs by a categorical variable that measured the number of separate morbidities. We tested variables in both sets for possible multicollinearity; the variance inflation factors ranged from 1.01 to 1.48, confirming that multicollinearity was not problematic. We tested all of the models as robust and performed all of the analyses using Stata/IC version 10.1 for Windows (StataCorp, College Station, TX).

Results

As Appalachian residents, we consider it appropriate to compare our sample with the overall demographically distinctive Appalachia region of the state. Consistent with Appalachian Kentucky, most participants were white (94.8%) and non-Hispanic (98.6%; Table 1). The mean age was 61.2 years. Subjects were predominately women (70.3%), were married or partnered (63.1%), and had a least a high school education or equivalency (78.3%). Our sample had proportionately more women (70.3% vs 54.2%) who were less likely to be married or partnered (63.1% vs 73.9%) and more likely to have low incomes (27.4% vs 19.3%) than the typical Appalachian Kentuckian. The rest of the survey sample characteristics were consistent with those of Appalachian Kentuckians in terms of age and education.

We report the results of bivariate tests for associations between the sociodemographic and economic sample characteristics and guideline-concordant screening in Table 2. A higher percentage of white subjects (vs nonwhite) or subjects with more than a high school education (vs those having a lower level of education) reported “any” guideline-concordant screening ($P < .05$ and $P < .01$, respectively). A higher percentage of subjects having either “just enough income to get by” or having “more than they needed to live well” reported undergoing a colonoscopy compared with their counterparts having lower incomes ($P < .05$). Similarly, a higher percentage of subjects having more than enough income on which to survive reported having “any” guideline-concordant screening when compared to the rest of the subjects ($P < .01$).

As indicated in Table 3, only 87 subjects (7.9%) reported having no morbidities. The most frequently reported chronic conditions were arthritis (61.5%), hypertension (59.3%), ulcers, heartburn or chronic bowel problems (37.7%), depression (31.4%), and heart disease (25.7%). Eight of 15 morbidities were associated with statistically significant increases in “any” guideline-concordant CRC screening prevalence compared with subjects without each of these morbidities. For subjects with GI diseases (n = 460), only stroke was associated with higher rates of “any” CRC screening ($P < .05$). We also investigated (not reported) whether these results were consistent among two subsets, a smaller group of subjects with GI or liver diseases (n=460) and a larger subset of subjects without GI and liver disease (n = 691). Among those with GI or liver disease, only stroke was associated with higher rates of “any” CRC screening ($P < .05$). Among those without GI or liver diseases, heart disease was associated with a higher rate of “any” CRC screening test ($P < .01$).

The association between MM burden and CRC screening is reported in Table 4. More than one-third (37.6%) of subjects reported having between 2 and 3 morbidities; one-fourth (25.2%) reported having between 4 and 5 morbidities, and 14.5% of subjects reported having 6 or more morbidities. Based on the results of the unadjusted tests of homogeneity, there was evidence for a dose-response trend in the outcome of the unadjusted odds of colonoscopy or any CRC screening with a greater number of morbidities: colonoscopy ($P < .01$) and “any” guideline-concordant CRC screening modality ($P < .01$). We also investigated

(not reported) whether these results were consistent among two subsets, a smaller group of subjects with GI or liver diseases (n = 460) and a larger subset of subjects without GI and liver disease (n = 691). When the unadjusted tests of homogeneity were performed for the smaller group of subjects with GI diseases, evidence for a dose-response relation remained for the number of morbidities in "any" guideline-concordant CRC screening ($P < .05$). When the same tests were performed for the larger group of subjects without GI diseases, the dose-response relation did not remain for either colonoscopy or any CRC screening.

The results of our multiple logistic regression analyses (Table 5) consist of two models each for colonoscopy and any CRC screening. Covariates include sociodemographic and economic characteristics, and either separate covariates for each of the 15 morbidities or a summary measure of comorbidity burden. Stroke and ulcer, heartburn, and chronic bowel problems increased the odds of colonoscopy (odds ratios 2.09 and 1.86, respectively). Only stroke and ulcer, heartburn, and chronic bowel problems were associated with an increased odds of "any" guideline-concordant CRC screening, adjusting for sociodemographic and economic sample characteristics. Compared with their counterparts with no morbidities, subjects with six or more chronic conditions had more than twice the odds of "any" CRC screening while controlling for the presence of GI diseases and sociodemographic and economic characteristics. Older subjects had higher odds of colonoscopy and any guideline-concordant screening. Subjects with more than a high school education and those indicating having more than enough income on which to survive had higher odds of colonoscopy and "any" CRC screening. Based on the results of the score tests for trend, adjusted for GI diseases and sociodemographic and economic sample characteristics, statistically significant trends in the outcome of adjusted odds ratios of colonoscopy with the increasing number of morbidities ($P < .05$) were noted.

Discussion

We found a dose-response relation between the number of MMs and the prevalence of CRC screening in residents of Appalachian Kentucky. Subjects with 6 or more conditions had 2.2 times the odds of reporting "any" guideline-concordant screening, as opposed to those without morbidities ($P < .05$), controlling for sociodemographic and economic characteristics and GI diseases.

Of note are the higher odds of CRC screening prevalence in subjects who indicated that they had more than enough income on which to survive compared with those who indicated that they had insufficient income. In addition, subjects with more than a high school education were almost twice as likely to report having had a colonoscopy and about 60% more likely to report having "any" CRC screening as compared with subjects who had not completed high school.

These results are meaningful for several reasons. First, to our knowledge, this is the first study to address specifically a health-disparities population, a group that is more likely to have MMs and less likely to obtain CRC screening. Second, contrary to most existing research, we found a positive relation between CRC screening prevalence and MMs. Our work joins a few exceptions to the extant literature. Sultan and colleagues[35] examined the relation between CRC screening and comorbidities in a prospective study, using a cohort of Veterans Affairs Medical Center patients between the ages of 50 and 64 years, and concluded that patients with potentially reduced life expectancy (based on the severity of morbidities and health status) were screened for CRC at relatively high rates. Min et al[36] found that vulnerable elders with MMs actually receive better quality of care than their counterparts with a lower morbidity burden. We relied on self-report data, particularly with regard to guideline-concordant CRC screening modalities,[37] and did not measure severity of

morbidities, which could have allowed us to assess subjects' life expectancy and risk of colonoscopy, for example.[35] Sultan et al[35] and Min et al[36] used a review of medical records and Heflin et al[24] used proxy respondents when necessary.

Although low socioeconomic status presents barriers to care access and is therefore associated with less screening, the highest level of MM burden was still associated with "any" CRC screening rate, even after controlling for education and financial status. We postulate that MM burden and the necessities of their management lead even people living under low socioeconomic conditions to healthcare providers, thus expanding the window of opportunity for coincident screening services. This finding may be especially salient for vulnerable populations, which may otherwise not receive preventive medical care.[3] Our finding of a positive dose-response relation between comorbidities and the likelihood of CRC screening can be used to guide clinical CRC screening strategies aimed specifically at increasing the amount of screening among vulnerable individuals who do not interact regularly with medical providers for the treatment of chronic conditions. For example, CRC screening recommendations and referral information could be targeted to urgent treatment centers, public health clinics, employee health clinics, and dental offices. These findings also support the need for primary care providers to use reminder systems designed to ensure that well patients come in for preventive care checkups.

The study had several limitations, including a relatively homogenous sample from a limited geographical region. This concern, however, is mitigated by the representativeness of our sample compared with the target Appalachian Kentucky population, as confirmed through a comparison of our sample characteristics with those of residents of Appalachian Kentucky. Because our intention was to examine an extremely vulnerable population, this was an appropriate sample. In addition, our sample was composed disproportionately of women, likely reflecting the older age of the sample and those who may be more willing to take and accessible for a telephone call. This was an observational cross-sectional study, as is typical of most survey designs. We cannot assume causality because we do not know for certain that the exposures of interest (MMs) preceded the outcomes (screening modalities). Moreover, the study may be subject to "late look bias,"[38] inasmuch as our sample includes only the survivors of chronic disease, and recall bias, to the extent that respondents, particularly those with dementia, forget that they have some chronic diseases. Although we measured chronic disease, we did not assess functional status or life expectancy, both of which are related to the need for CRC screening.

Finally, our subset analyses, which were not included in this article, revealed another potential limitation: We could not distinguish between extant upper-tract and lower-tract GI disease; in other words, a single survey question included mixed references to both upper-tract and lower-tract GI problems. Upper-tract GI problems would not necessarily lead to increased CRC screening or diagnostic tests, whereas lower-tract GI problems probably would lead to increased CRC screening or diagnostic tests. The fact that our subset analysis showed dose-response trends for MM and any CRC screening with the GI/liver disease cohort, but not the cohort without GI or liver disease, was curious and inconsistent. Future research in this area should focus on explanations for this seldom-described finding. In addition, this finding has meaningful clinical and behavioral implications, including ensuring provider screening recommendation during routine office visits and outreach, perhaps through community clinics and public health departments, to those extremely vulnerable populations lacking access to preventive care.

Conclusions

Having a greater number of comorbidities was associated with higher rates of CRC screening, as was white race, having a post–high school education, and the perception of having more than enough income on which to survive. We need to confirm whether such multimorbidity provides an opportunity for surveillance, and if so, how to improve the rates of CRC screening among people who rarely visit a physician.

Key Points

- White race, post–high school education, and a perception of having more than enough income with which to survive were associated with higher rates of "any" guideline-concordant colorectal cancer screening.
- The likelihood of either colonoscopy or any guideline-concordant screening increased with a greater number of morbidities.
- Statistically significant trends in the outcome of adjusted odds ratios for colonoscopy with a greater number of morbidities ($P < .05$) were found.

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Table 1

Frequency distribution of sample characteristics of the survey respondents compared to Kentucky and Appalachian Kentucky residents 50–76 years old

	Survey		Kentucky†	Appalachian Kentucky†
Mean age (in years)	61.2 (7.2)		61.8 (7.4)	61.0 (7.4)
Frequency (std. dev.)				
Sex	Frequency	Percent	Percent	Percent
Male	342	29.7	46.8	45.8
Female	811	70.3	53.2	54.2
Race				
White	1,093	94.8	92.8	96.3
Non-White‡	37	3.2	6.9	3.4
Prefer not to answer	23	2.0	0.3	0.3
Ethnicity				
Hispanic	16	1.4	1.4	2.3
Non-Hispanic	1,108	98.6	98.6	97.7
Marital status				
Married/partnered	711	63.1	76.6	73.9
Separated	20	1.8	1.1	2.3
Divorced	152	13.5	10.7	10.3
Widowed	162	14.4	8.0	9.8
Single/never married	79	7.0	3.6	3.7
Other	3	0.3	--	--
Education				
< High school	245	21.7	13.1	22.5
= High school/GED	407	36.1	35.9	35.8
> High school	476	42.2	51.0	41.7
Income				
< $15,000	252	27.4	11.9	19.3
$15,000 – $24,999	171	18.6	18.0	24.1
$25,000 – $34,999	120	13.1	12.2	14.4
$35,000 – $50,000	115	12.5	15.2	14.7
≥ $50,000	261	28.4	42.9	27.5
Total*	1,153		5,471	1,762

*The total number of respondents for each variable may differ due to sporadically missing data.

†Based on BRFSS 2009 (weighted data); only percentages are displayed based on such data. Percentages may not sum to 100% due to rounding.

‡Non-White includes Afro-American, Asian, and other.

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Table 2

Sample Characteristics and Bivariate Associations with Guideline Concordant Colorectal Cancer Screening

Socio-Demographic and Economic Characteristics (n = 1,153*)		Colonoscopy screening (n = 700*)		Any guideline concordant screening (n = 763*)	
		n	% Screened†	n	% Screened†
Sex					
Male	342	203	59.5	222	66.1
Female	811	497	61.7	541	67.8
Race					
White	1,093	673	61.8	734	68.1
Non-White‖	37	17	46.0	18	51.4‡
Marital status					
Married	711	440	62.1	480	68.6
Not-Married¶	416	250	60.4	272	66.2
Education					
< High school	245	131	53.7	154	64.4
= High school/GED	407	233	57.5	253	62.8
> High school	476	324	68.2§	343	73.1§
Financial Status					
Less than enough	398	217	54.8	242	61.7
Enough	494	306	62.2‡	331	68.1
More than enough	209	143	68.4‡	154	74.8§

*The total number of observations varies due to sporadically missing data.

†Percentage of respondents who reported guideline-concordant screening.

‡Statistically significant difference in a sample characteristic with regard to screening using a two independent samples or unpaired t-test, Chi-square test of independence or Fisher's exact, $p < 0.05$. Chi-square partitioning was conducting for the statistically significant relationships between a CRC screening modality and education, as well as a CRC screening modality and financial status.

§Statistically significant difference, $p < 0.01$.

‖Non-White includes Black/African-American, Asian, and other.

¶Not-Married includes single/never married, separated, divorces, widowed, and other.

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Table 3

Morbidities and Bivariate Associations with Guideline Concordant Colorectal Cancer Screening

Morbidity			Colonoscopy screening (n = 1,147*)		Any guideline concordant screening (n = 1,134*)	
	N‡	% Subjects with morbidity	N	% Screened†	N	% Screened†
None	87	7.9	86	50.0§	85	56.5§
Arthritis	707	61.5	703	62.7	695	69.1
Asthma	224	19.5	220	63.2	219	70.8
Alcohol or drug abuse	25	2.2	25	68.0	24	75.0
Cancer	193	16.8	192	70.3//	191	74.4§
Chronic lung disease	162	14.1	161	60.3	159	67.9
Dementia/Alzheimer's	11	1.0	11	72.7	11	72.7
Depression	361	31.4	360	64.7	356	71.6§
Diabetes	252	21.9	252	59.5	250	68.4
Heart disease	290	25.7	290	66.6§	287	76.0//
Hypertension	682	59.3	680	62.1	674	68.3
Kidney disease	85	7.4	85	67.1	84	77.4§
Liver conditions	59	5.1	59	72.9	59	81.4§
Movement disorders	28	2.4	28	53.6	28	60.7
Stroke	77	7.7	76	73.7§	75	82.7//
Ulcers, heart burn, chronic bowel problems	434	37.7	430	68.6//	426	75.4//

*Number of observations varies due to sporadically missing data.

†Percentage of respondents who reported a guideline-concordant screening.

‡Number of respondents who reported having no morbidities or a given condition.

§Statistically significant difference in screening among subjects with a morbidity (in addition to others) versus subjects without such morbidity using a chi-square test of independence or Fisher's exact, $p < 0.05$.

// Statistically significant difference, $p < 0.01$.

Table 4

Multimorbidity and Bivariate Associations with Guideline Concordant Colorectal Cancer Screening

Number of Morbidities			Colonoscopy screening		Any guideline concordant screening	
	N	% Subjects	N	% Screened†	N	% Screened†
No morbidities	87	7.9	86	50.0	85	56.5
1 morbidity	163	14.8	163	52.8	159	59.1
2–3 morbidities	413	37.6	411	61.6‡	408	65.7
4–5 morbidities	277	25.2	276	64.5	274	70.8‡
6+ morbidities	159	14.5	158	69.6‡	157	79.6§
Total*	1099	100.0	1,147		1,134	

*Number of observations varies due to sporadically missing data.

†Percentage of respondents who reported a guideline-concordant screening.

‡§Statistically significant difference among each level of morbidities and CRC screening with Chi-square test of independence or Fisher's exact, $p < 0.05$. Chi-square partitioning was conducting for the statistically significant relationships between a CRC screening modality and number of morbidities.

§Statistically significant difference, $p < 0.01$ based on the results of chi-square partitioning (i.e., using likelihood ratio chi-squared statistics).

Table 5

Multivariable Associations of Morbidities, Number of Morbidities and Guideline Concordant Colorectal Cancer Screening Modalities.

Chronic conditions and other sample characteristics	Colonoscopy screening (n = 1,018*)		Any guideline concordant screening (n = 1,008*)	
	OR† Model 1	OR† Model 2	OR† Model 3	OR† Model 4
Arthritis	1.08	--	1.00	--
Asthma	1.15	--	1.30	--
Alcohol or drug abuse	1.61	--	1.51	--
Cancer (other than colorectal)	1.41	--	1.21	--
Chronic lung disease	1.03	--	0.94	--
Dementia/Alzheimer's	1.67	--	1.11	--
Depression	1.19	--	1.22	--
Diabetes	0.84	--	0.89	--
Heart disease	1.13	--	1.41	--
Hypertension	0.82	--	0.80	--
Kidney disease	1.25	--	1.48	--
Liver disease	1.43	1.42	1.64	1.54
Movement disorders	0.45	--	0.48	--
Stroke	2.09‡	--	2.36‡	--
Ulcers, heartburn, chronic bowel problems	1.86§	1.76§	1.93§	1.77§
One morbidity vs. none	--	1.08	--	1.04
2–3 morbidities vs. none	--	1.42	--	1.25
4–5 morbidities vs. none	--	1.40	--	1.37
6+ morbidities vs. none	--	1.86		2.21‡
Age, yrs	1.05§	1.04§	1.05§	1.05§
Male vs. Female	1.00	0.99	0.98	0.99
White race vs. all other	1.88	1.75	2.24	1.93
Married vs. not	1.11	1.07	1.23	1.17
HS Education vs. <HS	1.31	1.26	1.01	0.98
College vs. < HS	1.99§	1.95§	1.57‡	1.53‡
Just enough vs. < enough	1.18	1.17	1.19	1.20
More than enough vs. < enough	1.59‡	1.62‡	1.70‡	1.76‡

*Number of observations varies due to sporadically missing.

‡$p < 0.05$

§$p < 0.01$

†Estimated adjusted odds ratio. All models were run as robust.