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Prevalence of Colon Polyps Detected by Colonoscopy Screening of Asymptomatic Hispanic Patients

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Abstract

Background—Compared with whites, Hispanics have lower incidence of and mortality from colorectal cancer. The purpose of this study was to determine whether asymptomatic Hispanics undergoing colonoscopy screening also have lower age-adjusted incidence of polyps ≥10 mm. Such data could be used to formulate future screening guidelines.

Aims—The objectives of this study were to measure and analyze the prevalence and location of polyps sized ≥10 mm in asymptomatic white and Hispanic patients who received colonoscopy screening.

Methods—Colonoscopy data were prospectively collected from the Clinical Outcomes Research Initiative database, which includes data from a consortium of 66 adult gastrointestinal practice sites in the United States. Asymptomatic white (n = 146,798) and Hispanic (n = 7,654) patients who received colonoscopy screening from 2004 to 2007 were identified. The prevalence of any polyps ≥10 mm and of proximal polyps ≥10 mm was adjusted for age, sex, practice site type, and family history of colorectal cancer in a multivariate analysis.

Results—There was no significant difference between prevalence of polyps ≥10 mm in Hispanic and white patients (5.8% vs. 6.2%; P = 0.11; adjusted OR 0.94; 95% CI0.85–1.03). There was also no significant difference between prevalence of proximal polyps ≥10 mm in Hispanics and whites (adjusted OR 1.05; 95% CI 0.87–1.27).

Conclusion—Despite lower incidence of colorectal cancer, the risk of polyps ≥10 mm for Hispanic patients undergoing colonoscopy screening is similar to that for whites. These data emphasize the importance of encouraging timely colorectal cancer screening in Hispanics. Our findings support the application of similar recommendations for colorectal cancer screening of Hispanics and whites.

Keywords

Hispanic; Colorectal cancer; Colon polyps; Colonoscopy; Screening

Introduction

In the United States, colorectal cancer is the third most commonly diagnosed malignancy, and is second in cancer- related deaths. An estimated 141,210 people will be diagnosed with colon or rectal cancer in the US in 2011, and there will be an estimated 49,380 cancer-related deaths [1]. Race and ethnicity seem to affect colorectal cancer incidence and

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mortality. Between 2003 and 2007, incidence and mortality among blacks were highest among the different races and ethnicities in the United States [1]. Black individuals who receive colonoscopy screening are at higher risk of advanced neoplastic lesions than white patients [2], which may contribute to the greater prevalence. Racial differences have also been observed for Hispanics. Data suggest that colorectal cancer incidence and mortality are lower in Hispanic patients [1, 3, 4]. Compared with whites, from 2003 to 2007 incidence was13–17% lower in Hispanics [1]. Previous studies suggest that Hispanics may have a higher likelihood of distal polyps and tumors than white patients [3, 5, 6], which may support sigmoidoscopy as an acceptable screening modality.

Colon screening guidelines in 2008 emphasize the importance of screening for cancer prevention, by detection and removal of pre-cancerous lesions. Colon cancer screening may be less effective if there are racial differences in age-adjusted prevalence and location of these lesions. Current colorectal cancer screening guidelines from the American Cancer Society, the Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology recommend initiation of screening at age 50 years for all races [7]. The decline in colorectal cancer mortality in white patients has been ascribed to early detection and treatment; the same decline has not been observed among other racial minority groups, however [8]. Although the prevalence of colorectal cancers is lower for Hispanics, they also undergo less colorectal cancer screening [8–15]. This may affect the prevalence of colorectal cancer because less screening may result in less cancer detection. On the other hand, if Hispanics are a lower risk population, screening at age 50 may be of less benefit and be less cost-effective than screening white patients. There have been few studies of the prevalence of cancer precursor lesions in these populations, which could affect screening recommendations.

On the basis of evidence that the prevalence of colorectal cancer is lower for Hispanics than for whites, this study will test the hypothesis that the prevalence of cancer precursor lesions is lower in Hispanic patients. We used one or more polyps greater than or equal to 10 mm as a surrogate for advanced neoplasia, on the basis of previous work demonstrating the validity of this endpoint [2, 16]. Our primary objectives were to measure the prevalence and location of polyps ≥10 mm in diameter in Hispanic and white patients who received colonoscopy screening in diverse practice settings across the United States. We identified asymptomatic Hispanic and white patients who had received colonoscopy screening and compared these outcomes.

Methods

Clinical Outcomes Research Initiative

During the study period, the Clinical Outcomes Research Initiative (CORI) represented a consortium of 66 adult gastrointestinal practices, including 500 physicians in 26 states, which used a computerized endoscopic procedure report generator to produce their endoscopic reports. Reports from each site are transmitted electronically to a central data repository and merged for analysis. Practice sites include private practice (80% of colonoscopy reports), academic sites (9%), and Department of Veterans' Affairs and military sites (11%). In clinical practice, screening examinations are performed on outpatients, either in ambulatory endoscopy centers or in hospitals. Practice sites were selected to represent a complete range of gastrointestinal practices and to include both urban and rural sites in each region of the country, and there is evidence that the database is representative of endoscopy practice in the United States [17]. A limited data set is collected from the local site, and only de-identified data are analyzed in aggregate form to protect both patient and physician confidentiality. The data were subjected to quality-control checks to identify missing fields. Internalized quality-control checks included size description and

drug dosage. After completion of quality-control checks, data from all sites were merged in the data repository for analysis. Site compliance was assessed annually. Sites provided record counts of procedures, which were compared with procedure counts in the data repository. If sites failed to record more than 95% of endoscopic reports using CORI software, they were notified to improve compliance. Failure to improve compliance resulted in exclusion of the site's data from analysis.

The CORI database is reviewed annually by the institutional review board at Oregon Health and Science University. Use of the limited dataset, as outlined above, is subject to a waiver of consent.

Patients

Data were prospectively collected between January 1, 2004, and December 31, 2007. Patients were included in the analysis if they received colonoscopy for screening and were adults. Patients were excluded if they had any other indication for colonoscopy, for example the presence of lower gastrointestinal symptoms or positive fecal occult blood test result. Patient undergoing colonoscopic surveillance after previous removal of polyps or cancer were also excluded.

Patients demographics, including age and sex, were entered by the endoscopist. Race and ethnicity were mandatory field requirements. Using the United States Census definitions, white patients were defined as non-Hispanic white, and Hispanic patients were defined as any patient with Hispanic ethnicity irrespective of race. Race information was provided by the endoscopist, not directly by the patient, which could result in some misclassification.

Colonoscopy End Points

In this database, physicians are asked to provide detailed information about every polyp, including use of the descriptors size, location, morphology (pedunculated, sessile, or flat), and method of removal. Because pathology results are provided for 23.1% of colonoscopy reports, we used the finding of one or more polyps sized ≥10 mm in diameter or suspected malignant tumor as a surrogate end point for prevalence of advanced polyps in the cohorts.

A prior analysis was performed to determine if the surrogate end point was representative of patients with advanced neoplasia [2, 16]. That analysis was performed on 13,609 screening examinations in which histology for each polyp was determined [16]. We performed a previous study assessing the histology of the most advanced lesion found during colonoscopy screening [16]. On the basis of our previous analysis of histologically proven advanced neoplasia, we calculated the possibility of misclassification using the surrogate. Based on histology, 84% of polyps ≥10 mm were advanced adenomas (defined as tubular adenoma, villous adenoma, serrated adenoma, or adenoma with high-grade dysplasia or cancer). 16% of polyps ≥10 mm were not neoplastic, and most (76%) were hyperplastic. Age, sex, race, and screening indication were similar among patients with histologically proven advanced histology and patients with the surrogate end point (Appendix).

In addition, among all the patients screened, 4,942 (36%) had one or more polyps \10 mm as their most advanced lesion. One hundred and forty-two subjects with small polyps had advanced histology (defined as villous, high-grade dysplasia, or cancer). This group represented only 1% of all screened patients. Therefore, the likelihood that misclassification of these patients would alter the outcome is very low.

Proximal location was defined as colon including and proximal to the splenic flexure. Proximal findings also included patients having one or more polyps sized ≥10 mm in diameter in both proximal and distal locations.

Statistical Analysis

We constructed two multivariate logistic regression analyses for the end points:

1. polyps sized ≥10 mm; and
2. patients with proximal polyps sized ≥10 mm.

Potential covariates in the models included age, sex, screening indication, and practice site type. Variables were retained in the model if they were statistically significant or were confounding with race or ethnicity. The adjusted odds ratio (OR) of each outcome was separately calculated with 95% confidence intervals (CI). Comparison of demographic data was performed by use of Pearson v2 tests or, for small cell sizes, Fisher exact tests. All analyses were performed with SAS version 9.1 (SAS Institute, Cary, North Carolina, USA).

We estimated the risk of polyps sized ≥10 mm and calculated the number needed to endoscope (NNE) to identify one patient with this end point on the basis of the logistic multivariate model. This regression model was used to generate the estimated probability of the outcome occurring given specified levels of the variables in the model. The NNE is the reciprocal of the estimated probability. This calculation enables meaningful comparisons of risk by age, sex, and race/ethnicity.

Results

Between January 1, 2004, and December 31, 2007, 463,229 unique patients had a colonoscopy reported to the CORI database. A total of 126,700 patients received colonoscopy for average-risk screening and 37,209 patients received colonoscopy because of a family history of colorectal cancer or polyps. Of 163,909 patients, 154,452 remained in the analysis (146,798 white and 7,654 Hispanic) and 9,457 patients were excluded because of other race or ethnicity. Patient characteristics are shown in Table 1. After excluding the VA/military population, 48% were women. The VA/military population was included in the univariate and multivariate analyses. The mean age in all groups was approximately 60 years. More than 80% of patients came from community-based practices.

The prevalence of polyps sized ≥10 mm in diameter is shown in Table 2. A total of 9,164 white patients (6.2%) had one or more polyps sized ≥10 mm, compared with 443 Hispanic patients (5.8%) (P = 0.11). There was no significant difference between the prevalence of polyps sized ≥10 mm in diameter in Hispanic and white patients across all age groups. Prevalence for Hispanic women was similar to that for white women. Hispanic men had a slightly decreased prevalence (6.6%) compared with white men (7.6%), which was statistically significant (P = 0.03).

Results from multivariate analysis for the outcome of polyps sized ≥10 mm in diameter is shown in Table 3. Risk for Hispanic patients was similar to that for white patients (OR, 0.94; 95% CI 0.85–1.03). There is an increased risk associated with age older than 50 years. This risk increases with advanced age. Patients aged 60–69 had a significantly increased risk compared with patients 50–59 years. There was no statistically significant difference associated with a positive family history of colorectal cancer. Overall, men were more likely to have polyps sized ≥10 mm in diameter than women (OR, 1.61; 95% CI 1.54–1.69). Patients receiving colonoscopy at an academic center were less likely to have polyps sized ≥10 mm detected than those receiving colonoscopy at community practices (OR 0.81; 95% CI 0.74–0.89). Given the relatively smaller sample size in academic centers, it is likely conclusions cannot be made.

As an expression of the absolute risk of demographic characteristics, we used this multivariate logistic regression model to calculate the NNE to identify one patient with a

polyp sized ≥10 mm (Table 4). This analysis enables comparison of asymptomatic patients receiving colonoscopy screening by age, sex, and race/ethnicity. For whites and Hispanics, the NNE decreases with increasing age. Men have a lower NNE than women within every age group. White and Hispanic men and women have similar NNE across all age groups.

A second objective of our analysis was to determine and compare the risk of proximal polyps sized ≥10 mm in white and Hispanic patients. We identified all patients who had one or more proximal polyps sized ≥10 mm, with or without distal polyps. The prevalence data stratified by age, sex, and race are presented in Table 5. There was no significant difference between the prevalence of proximal polyps sized ≥10 mm among whites and Hispanics. Results from the multivariate analysis for the prevalence of proximal polyps sized ≥10 mm are presented in Table 6. Hispanics and whites had a similar relative risk of proximal polyps sized ≥10 mm. Men were less likely than women to have proximal polyps (OR, 0.84; 95% CI 0.77, 0.91). Patients with a family history of colon cancer were more likely to have proximal polyps than average risk patients (OR, 1.13; 95% CI 1.02, 1.25).

Discussion

Previous research has shown there are important racial and ethnic differences in colorectal cancer incidence and mortality. Recent American Cancer Society data show that colorectal cancer prevalence is lower in Hispanics than in whites [1]. Although prevalence has decreased in Hispanic men and women from 1997 to 2006, the rate of decline is less than in whites [1, 18]. One possible explanation of these differences may be biological differences. Colorectal cancer mortality is also lower in Hispanics than in whites [1]. This may be because of the lower prevalence of colorectal cancer in Hispanics than in whites. Survival after diagnosis of colorectal cancer is, however, poorer for Hispanics [19]. This may be because of several factors, including biologically more aggressive tumors, delay in diagnosis because of less screening [8–15, 20], and less cancer-directed treatment in lower socioeconomic groups [21]. According to National Health Interview Survey data, trends in adults undergoing screening colonoscopy and being up-to-date with colorectal cancer screening have increased between 2000 and 2008, including in Hispanic patients. However, colonoscopy use and up-to-date screening was consistently lower for Hispanics than for non-Hispanic whites [22]. Despite expansion of Medicare coverage for colorectal cancer screening tests, Hispanics are still less likely than whites to undergo a screening test for colorectal cancer [9, 23].

We hypothesized that if biological differences were contributing to lower prevalence in Hispanics, we would find a lower incidence of important cancer precursor lesions among individuals who do receive colonoscopy screening. However, our results show that in an asymptomatic screening population, prevalence of polyps sized ≥10 mm is similar in Hispanic and white patients. These data could be interpreted in several ways. First, it is possible that precursor lesions have different biological behavior in Hispanics, and are less likely to progress to colorectal cancer than in whites. If this were true, the finding of a similar incidence of cancer precursor lesions would not necessarily be a harbinger of risk in Hispanics. A second, and more likely, interpretation is that the similar cancer precursor incidence in Hispanics and whites reflects assimilation. Because of similar environmental exposure, diet, and risk factors (for example obesity, diabetes, tobacco, alcohol), Hispanics may now be as likely to develop cancer precursor lesions as whites [4]. A similar phenomenon was shown for Japanese immigrants to the United States, for whom cancer prevalence similar to that for whites developed within one generation in the US [24,25]. The prevalence of colorectal cancer is higher in Hispanics living in the US than in residents of Puerto Rico [26], presumably because of assimilation. Foreign-born immigrants also have lower mortality from colorectal cancer than US-born minorities [27].

Our results have several key implications. This discrepancy between colorectal cancer and cancer precursor prevalence may be because cancer prevalence is likely to lag behind cancer precursor prevalence. If we assume the biological behavior of cancer precursors is similar in Hispanics and whites, we might expect to see the prevalence of colorectal cancer in Hispanics approach that in whites over the next 1–2 decades. Previous studies have suggested that initiation of screening at age 50 years was less cost- effective for Hispanics than for whites [3]. Our results suggest screening recommendations should be similar for Hispanics and whites.

The location of advanced neoplasia can be an important determinant of the type of screening test selected. Sigmoidoscopy will be less effective in populations with greater prevalence of proximal neoplasia. Previous studies have suggested that the prevalence of distal lesions in Hispanics is similar to, or slightly higher than, that in whites, [28]. In our study we found the prevalence of proximal lesions in Hispanic patients was similar to that in white patients. It is likely some of these lesions would have been missed by sigmoidoscopy alone. Up to half of patients with proximal lesions lack distal neoplasia [29], with many of these proximal colorectal cancers presenting at advanced stage and less susceptible to curative resection. Our results suggest colonoscopy is the preferred screening test for a complete evaluation of the colon in most patients, particularly after age 60 years.

Our study has several limitations. Hispanics are heterogeneous groups with internal diversity, and classifying them together may not accurately represent the Hispanic populations. Environmental factors, diet, and extent of assimilation unique to each diverse subgroup are likely to contribute to differences in cancer precursor development. Racial disparities in screening behavior occur as a result of socioeconomic status [30], which we were not able to adjust for in this study. We recognize that many patients undergoing screening colonscopy (i.e. insured) may differ in important ways from the general population who do not. Race/ethnicity information was provided by the endoscopist and is, therefore, subject to possible misclassification. Patient self-identification may be a more appropriate way of classifying race and ethnicity data in the future. Given limited available histology data, we used a surrogate endpoint for advanced neoplasia (polyp(s) sized ≥10 mm). We have shown the surrogate end point to be related to the actual rate of histologically proved advanced neoplasia in a screening cohort (Appendix), although it is not perfect. Ten to twenty percent of patients with polyps sized ≥10 mm do not have neoplasia [29, 31], introducing possible misclassification bias. Most of these patients without histologically proved advanced neoplasia have hyperplastic polyps sized ≥10 mm, which may be clinically important [32]. Large colonoscopy screening studies have found that2–10% of polyps sized less than 10 mm have advanced histological features [16, 29, 31, 33]. Therefore, a small number of patients with advanced histology were excluded from this analysis by virtue of polyp size, which could introduce bias if there were racial differences between the incidence of advanced histology in small or large polyps. Previous work suggests that estimates of polyp size at endoscopy could be subject to error [34]. Finally, the CORI consortium may not be representative of endoscopic practice in the United States. Physicians who participate in CORI are comfortable using computers to generate endoscopy reports and to share data. However, in a recent analysis, we compared CORI data for patients aged 65 years or older with a Medicare data set and found the CORI patients to be similar to the Medicare population receiving endoscopy [17].

In summary, we found that prevalence of polyps sized ≥10 mm in asymptomatic Hispanic men and women undergoing colonoscopy screening is similar to that in whites. If cancer precursors progress to cancer at the same rate as in whites, we might expect to see an increase in the overall prevalence of colorectal cancer in Hispanics in the future. These findings emphasize the importance of encouraging timely colorectal cancer screening in this

population. Our findings support the application of similar recommendations for colorectal cancer screening in Hispanics and whites.

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Appendix

See Table 7.

Table 7

Pathology verification of the surrogate outcome [16]

Characteristic	Polyps sized ≥10 mm N = 949	Histologic advanced neoplasia (non-tumor) N = 920
Indication		
Routine/average risk	517(54.5%)	492(53.5%)
Family history	159(16.8%)	161(17.5%)
?FOBT/polyp on sigmoidoscopy	273(28.8%)	267(29.0%)
Age group		
<50	54(5.7%)	50(5.4%)
50–59	397(41.8%)	362(39.4%)
60–69	311(32.8%)	310(33.7%)
70–79	150(15.8%)	157(17.1%)
≥80	37(3.9%)	41(4.5%)
Mean age years (SD)		
Gender		
Female	314(33.1%)	298(32.4%)
Male	635(66.9%)	622(67.6%)
Race/ethnicity		
White	799(84.2%)	780(84.8%)
Black	99(10.4%)	88(9.6%)
Asian/Pacific Islander	18(1.9%)	19(2.1%)
Native American	6(0.6%)	6(0.7%)
Multi-racial	6(0.6%)	7(0.8%)
Hispanic	20(2.1%)	19(2.1%)
Missing	1(0.1%)	1(0.1%)

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Table 1

Patient demographics by race/ethnicity

	White (n = 146,798)	Hispanic (n = 7,654)	P value
Indication			
Routine/average risk	112,417(76.6)	6,536(85.4)	\0.0001
Family history	34,381(23.4)	1,118(14.6)	
Age, years			
<50	8,724(5.9)	506(6.6)	\0.0001
50–59	69,633(47.4)	3,770(49.3)	
60–69	44,225(30.1)	2,279(29.8)	
≥70	24,216(16.6)	1,099(14.4)	
<60	78,357(53.4)	4,276(55.9)	\0.0001
Mean age, years (SD)	60.5(9.2)	59.8(9.0)	\0.0001
Sex			
Female sex	70,842(48.3)	3,874(50.6)	\0.0001
Female sex excluding	69,312(52.2)	3,702(56.2)	\0.0001
VA/military (n = 140,837)			
Practice site type			
Community/HMO	123,884(84.4)	6,383(83.4)	\0.0001
Academic	9,001(6.1)	206(2.7)	
VA or military	13,913(9.5)	1,065(13.9)	

SD, standard deviation; VA, veterans' affairs; HMO, health maintenance organization

Table 2

Unadjusted prevalence of polyps sized ≥10 mm by race/ ethnicity

Prevalence	White	Hispanic	P value
Overall	9,164/146,798 (6.2)	443/7,654 (5.8)	0.11
Routine/average risk	7,199/112,417 (6.4)	372/6,536 (5.7)	0.02
Family history	1,965/34,381 (5.7)	71/1,118 (6.4)	0.37
Age, years			
<50	383/8,724 (4.4)	17/506 (3.4)	0.27
50–59	3,678/69,633 (5.3)	190/3,770 (5.0)	0.52
60–69	3,149/44,225 (7.1)	162/2,279 (7.1)	0.98
≥70	1,954/24,216 (8.1)	74/1,099 (6.7)	0.11
<60	4,061/78,357 (5.2)	207/4,276 (4.8)	0.33
≥60	5,103/68,441 (7.5)	236/3,378 (7.0)	0.31
Sex			
Female	3,392/70,842 (4.8)	193/3,874 (5.0)	0.58
Male	5,772/75,956 (7.6)	250/3,780 (6.6)	0.03
Practice site type			
Community/ HMO	7,645/123,884 (6.2)	346/6,383 (5.4)	0.01
Academic	458/9,001 (5.1)	20/206 (9.7)	\0.01
VA or military	1,061/13,913 (7.6)	77/1,065 (7.2)	0.64

VA, veterans' affairs; HMO, health maintenance organization

Table 3

Relative risk estimates of polyps sized ≥10 mm by multivariate analysis

Characteristic	Odds ratio	95% Confidence interval
Race/ethnicity		
White non-Hispanic	1.0 (reference)	
Hispanic	0.94	0.85, 1.03
Age group, years		
<50	1.0 (reference)	
50–59	1.21	1.09, 1.35
60–69	1.67	1.50, 1.86
≥70	1.92	1.72, 2.15
Sex		
Female	1.0 (reference)	
Male	1.61	1.54, 1.69
Practice site type		
Community/HMO	1.0 (reference)	
Academic	0.81	0.74, 0.89
VA/military	1.06	0.99, 1.13

Adjusted for age, sex, and practice site type. Indication was not significant and therefore was excluded from the model

Table 4

NNE to identify one patient with polyps sized ≥10 mm

Age group, years	White		Hispanic	
	Female	Male	Female	Male
<50	30	19	32	21
50–59	25	16	27	17
60–69	19	12	20	13
≥70	16	11	17	11

The final logistic regression model included age, sex, race/ethnicity, indication, and practice site type

Table 5

Prevalence of proximal polyps sized ≥10 mm, stratified by age, sex, and race

Age, years	Number/total number (%) of women		P value
	White	Hispanic	
<50	87/4,388 (2.0)	4/262 (1.5)	0.60
50–59	677/33,274 (2.0)	40/1,897 (2.1)	0.82
60–69	593/21,060 (2.8)	38/1,184 (3.2)	0.43
70–79	368/10,175 (3.6)	13/463 (2.8)	0.36
≥80	78/1,945 (4.0)	3/68 (4.4)	0.75[a]
≥60	1,039/33,180 (3.1)	54/1,715 (3.2)	0.97

Age, years	Number/total number (%) of men		P value
	White	Hispanic	
<50	98/4,336 (2.3)	6/244 (2.5)	0.84
50–59	987/36,359 (2.7)	55/1,873 (2.9)	0.57
60–69	1,046/23,165 (4.5)	47/1,095 (4.3)	0.73
70–79	566/10,446 (5.4)	17/499 (3.4)	0.05
≥80	90/1,650 (5.5)	3/69 (4.4)	0.69
≥60	1,702/35,261 (4.8)	67/1,663 (4.0)	0.14

[a]Computed with Fisher's exact test (two-tailed) because of small cell sizes

Table 6

Relative risk estimates of proximal polyps sized ≥10 mm by multivariate analysis

Characteristic	Odds ratio	95% Confidence interval
Race/ethnicity		
White non-Hispanic	1.0 (reference)	
Hispanic	1.05	0.87, 1.27
Indication		
Routine/average risk	1.0 (reference)	
Family History	1.13	1.02, 1.25
Age group, years		
<50	1.0 (reference)	
50–59	0.94	0.76, 1.17
60–69	1.24	1.00, 1.54
≥70	1.45	1.16, 1.81
Sex		
Female	1.0 (reference)	
Male	0.84	0.77, 0.91

Only patients with advanced neoplasia were analyzed (n = 9,607)