

Prevalence and Correlates of Skin Cancer Screening among Middle-aged and Older White Adults in the United States

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ABSTRACT

BACKGROUND: Total skin examinations performed by a physician have the potential to identify skin cancers at an early stage, when they are most amenable to successful treatment. This study examined the prevalence rates of, and factors associated with, receipt of a total skin examination by a dermatologist or other doctor during the past year.

METHODS: The participants were 10,486 white men and women aged 50 years and older drawn from a random sample of 31,428 adults aged 18 years and older who took part in the 2005 National Health Interview Survey. The data were collected via in-person interviews, and participants answered questions about their receipt of total skin examinations, their demographic characteristics, health and health care access, receipt of other cancer screenings, and personal and family history of skin cancer.

RESULTS: Sixteen percent of men and 13% of women reported having a skin examination in the past year. The factors associated with lowest skin examination rates in multivariable analyses included younger age (50-64 years), lower education level, lack of screening for colorectal, breast (women only), and prostate cancers (men only), and lack of a personal history of skin cancer.

CONCLUSIONS: Rates of having a skin examination in the past year were low among men and women and among all sub-groups. Systematic efforts are needed to increase screening rates among higher risk individuals. Physicians should be particularly aware of the need to consider skin cancer screening examinations for their male, elderly patients, as well as individuals with less education.

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Melanoma incidence has been increasing for decades. In 1960, the lifetime risk of melanoma in the United States was 1 in 800,¹ and it is currently 1 in 39 for men and 1 in 58 for women.² The risk of melanoma increases significantly with age, and melanoma rates have increased most substantially among middle-aged and older white men, who comprise nearly 50% of all melanoma deaths.³ An estimated 68,720

Americans were diagnosed with melanoma in 2009, and the disease accounted for 8650 deaths.²

The early detection and treatment of melanoma is a critical approach for reducing disease mortality.⁴ Melanoma survival rates are inversely related to tumor thickness at diagnosis,⁵ and physicians are able to detect thinner melanomas than patients or their family members.^{6,7} Full-body skin cancer screening is a safe, noninvasive, painless pro-

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cedure that can be performed by dermatologists as well as primary care physicians.^{8,9} Recent evidence indicates that physician skin examinations may reduce the incidence of thick melanomas.¹⁰ There is, however, a lack of consensus about recommendations for full-body skin cancer screening performed by physicians. Due to the lack of randomized controlled trials of the effect of skin cancer screening on disease morbidity and mortality, the United States Preventive Services Task Force has concluded that there is insufficient evidence to recommend for or against such screening.¹¹ However, other agencies recommend periodic skin cancer screening examinations. The American Cancer Society recommends that physicians screen individuals aged 20 years and older for skin cancer as part of a cancer-related checkup that can be incorporated into a periodic general health examination.¹²

Several studies have documented skin cancer screening rates from nationally representative surveys of US adults. Saraiya et al¹³ reported that 15% of adults participating in the 2000 National Health Interview Survey (NHIS) had ever been screened for skin cancer by a physician and 8% had a recent screening (ie, within the past 3 years for those aged 18-39 years and within the past year for those aged 40 years and older). Using data from the 2000 and 2005 NHIS and focusing only on adult workers, LeBlanc et al¹⁴ found similar screening rates to those reported by Saraiya et al.¹³ Characteristics associated with higher reported screening rates in prior studies include older age, white race, higher educational level, having health insurance, greater use of sunscreen, and a family history of melanoma.^{13,14}

Incidence rates of melanoma are rising among middle-aged and older white adults, and the mortality rate for men aged 50 years and older continues to increase. Given the lack of data on skin cancer screening rates in these population subgroups, the current study examined the sex-stratified prevalence and correlates of having a total skin examination in the past year among white individuals aged 50 years and over. Potential correlates examined included demographics, health and health care access, screening for cancers other than skin cancer, and skin cancer personal and family history.

METHODS

Procedure

We used data from the 2005 NHIS, which is an annual, national probability health survey of civilian, noninstitutionalized US adults. Trained interviewers from the US Census Bureau interview NHIS participants in their own

homes, and the survey utilizes a multistage, clustered, cross-sectional design, including state-level stratification, and oversampling of Hispanic and black individuals. Additional information about the 2005 NHIS is available elsewhere.¹⁵

CLINICAL SIGNIFICANCE

- Among white individuals aged 50 years and over, rates of having a skin examination in the past year are low.
- Factors associated with lower skin examination rates include lower education, lack of a personal history of skin cancer, and lack of screening for other cancers.
- Skin examinations can be conducted as part of a cancer-related checkup during a general health examination, particularly for patients with well-established risk factors for melanoma.

Participants

A total of 31,428 individuals were selected as Sample Adults for the 2005 NHIS. We excluded individuals who were under the age of 50 years, not white, or did not indicate whether they had a total skin examination in the past year, leaving an available sample size of 10,486 participants. We included only individuals reporting white race, due to their considerably higher rate of developing melanoma compared with other racial groups (eg, 10-fold risk compared with African-Americans).²

Measures

Demographics. Participants reported their age, sex, race/ethnicity, education, and marital status, and their region of residence (Northeast, Midwest, South, or West) was noted.

Health and Health Care Access. Participants indicated their overall health (using a 5-point scale from *poor* to *excellent*), their source of preventive health care, and whether they had any private or public health care insurance coverage. Participants also reported the number of times they visited a physician in the past year. We report data for this variable for descriptive purposes but did not examine its association with receipt of skin cancer screening (because individuals reporting no visits could not have received a physician skin examination in the past year).

Receipt of Screening for Colorectal, Breast, and Prostate Cancer. Participants completed questions about the timing of their last sigmoidoscopy or colonoscopy (asked as a single question) and home-based fecal occult blood test. Consistent with prior research using NHIS data,^{16,17} we denoted individuals as being adherent to colorectal cancer screening guidelines¹⁸ if they reported having a sigmoidoscopy or colonoscopy in the past 10 years or a home-based fecal occult blood test in the past year. Women were asked when they last received a mammogram and we coded responses according to whether they had received one in the past year. Men were asked to indicate when they last had a prostate-specific antigen (PSA) test and we denoted them as either having or not having a test in the past year.

Personal and Family History of Skin Cancer. Participants indicated whether they had ever been diagnosed with skin cancer, and if so, what type of cancer. They also were asked

whether a first-degree relative had ever been diagnosed with skin cancer, and if so, what kind of cancer it was.

Receipt of a Total Skin Examination. Participants were asked whether they had ever had a total skin examination performed by a dermatologist or other doctor (asked as a single question), and if so, when the most recent examination was performed. We coded individuals in terms of whether they reported having a total skin examination in the past year.

Statistical Analyses

Using a series of chi-squared analyses stratified according to sex, we examined the association between each correlate and reported past-year receipt of a total skin examination. We conducted follow-up multiple logistic regression analyses stratified by sex, with the significant correlates (at $P < .01$) from the chi-squared analyses as independent variables and past-year total skin examination status as the dichotomous outcome variable. All analyses were conducted using SUDAAN (version 9.0.1, Research Triangle Institute, Research Triangle Park, NC), which allowed for weighting based on design, ratio, and nonresponse adjustments, and poststratification adjustments for 2000 US Census-based estimates of age, sex, and race/ethnicity. In view of the large sample sizes for the analyses, we used a cutoff of $P < .01$ to determine statistical significance for all analyses.

RESULTS

Sample Characteristics

Just over half (54%) of the participants were female. Almost all participants (91%) reported at least one visit to a physician in the past year (median = 4-5 visits). As shown in the first column in Table 1, there was considerable variability with regard to participants' region of residence and level of education. Half of the participants reported their health as being very good or excellent, three quarters reported receiving their preventive health care at a doctor's office or health maintenance organization, and more than two thirds reported having private health insurance. Around half of the participants met the guidelines for colorectal cancer screening, with a similar percentage of women reporting a past year mammography, and 43% of men reporting a PSA test in the past year. Relatively few individuals reported either a personal or family history of skin cancer.

Sex-stratified Correlates of Having a Total Skin Examination in the Past Year

The rate of having a past-year skin examination was significantly higher among men than women, although the absolute rates were low for both groups (16% and 13%, respectively, $P = .001$). As shown in Table 1, men aged 50-64 years were less likely to have had a skin examination in the past year than older men. Among women, those aged 50-64

years and 80 years and older were less likely to have had a skin examination in the past year than those aged 65-79 years.

Among both men and women, lower skin examination screening rates were reported among those with less education. Not being married or partnered was associated with a lower past-year skin examination rate among men but not among women. Self-reported health was not associated with skin examination screening rates among men or women. Lower skin examination rates were found among men and women who do not receive preventive care from a doctor's office or health maintenance organization, as well as among those who reported having no health care coverage.

For each type of cancer screening examined (colorectal, breast, prostate), individuals lacking screening had a lower reported rate of past-year skin examination. Having no personal history of skin cancer was associated with a lower past-year skin examination rate among men and women. Lack of a family history of skin cancer also was linked with a lower past-year skin examination rate among men and women.

The results of the multiple logistic regression analyses are shown in Table 2. The factors associated with lower reported rates of having a past-year skin examination were consistent across men and women. These factors included younger age (50-64 years), lower education, lack of screening for other cancers (ie, colorectal cancer screening for men and women, mammography for women, and PSA testing for men), and not having a personal history of skin cancer.

DISCUSSION

This study used data from a nationally representative sample to examine the sex-stratified prevalence and correlates of having a total skin examination in the past year among white individuals aged 50 years and over. By focusing on this population at increased risk of dying from melanoma, the study results highlight subgroups that may benefit most from interventions to promote skin cancer screening. Identifying correlates of screening provides information on factors that may promote or hinder receipt of a physician routine total skin examination. Consistent with prior research,^{13,14} overall rates of having a skin examination in the past year were very low (16% among men and 13% among women) and leave considerable room for improvement. Of note, the skin examination screening rates were considerably lower than the screening rates for breast (54%), prostate (43%), and colorectal cancers (51%) found in the current study. This is likely due to multiple physician, patient-related, and systems factors, including inconsistent skin examination screening recommendations, physicians' perceived lack of time for performing an examination, lack of relevant training, lack of patient demand for examinations, intake forms that rarely highlight the need for a skin examination, and inadequate reimbursement.^{9,19,20}

Table 1 Frequencies for Study Variables in the Full Sample and Sex-stratified Correlates of Having a Total Skin Examination in the Past Year, 2005 National Health Interview Survey

	Frequency in Full Sample (N = 10,486) %	Prevalence of Having a Total Skin Examination in the Past Year	
		White Men n = 4454 % ± 95% CI	White Women n = 6032 % ± 95% CI
Full sample	—	15.7 ± 1.2	13.3 ± 1.0
Sex			
Male	46.4	—	—
Female	53.6	—	—
Missing (n)	0		
Age (years)			
50-64	58.5	12.3** ± 1.3	12.2** ± 1.2
65-79	30.3	21.8 ± 2.5	16.0 ± 1.8
≥80	11.2	17.8 ± 3.9	11.5 ± 2.2
Missing (n)	0		
Region			
Northeast	20.0	15.3 ± 2.3	16.3 ± 2.3
Midwest	26.0	14.0 ± 2.2	11.9 ± 1.6
South	34.2	16.5 ± 2.3	12.7 ± 1.7
West	19.8	16.8 ± 2.3	13.3 ± 2.5
Missing (n)	0		
Education level			
Some high school or less	17.2	9.4** ± 2.3	8.3** ± 1.7
High school graduate	32.1	11.8 ± 2.1	10.8 ± 1.6
Some college	24.9	14.6 ± 2.1	15.4 ± 1.9
College graduate	25.8	23.7 ± 2.7	19.2 ± 2.2
Missing (n)	93		
Marital status			
Married/partnered	68.5	16.8** ± 1.4	13.7 ± 1.3
Not married/partnered	31.5	11.4 ± 1.7	12.6 ± 1.3
Missing (n)	37		
Self-reported health			
Poor/fair	19.6	12.3 ± 2.5	11.6 ± 2.2
Good	30.8	15.9 ± 2.1	11.9 ± 1.6
Very good	29.8	15.9 ± 1.9	14.0 ± 1.7
Excellent	19.8	18.1 ± 3.2	16.2 ± 2.3
Missing (n)	5		
Source of preventive care			
Doctor's office or HMO	79.5	17.4** ± 1.4	14.5** ± 1.2
Clinic/health center/other	15.7	11.0 ± 2.6	9.2 ± 2.0
None	4.8	7.3 ± 3.1	1.6† ± 2.2
Missing (n)	7		
Health care coverage			
Private	72.0	16.9** ± 1.4	14.8** ± 1.2
Public	21.2	14.5 ± 2.5	11.0 ± 1.9
None	6.9	5.4 ± 2.9	4.5 ± 2.1
Missing (n)	12		
Colorectal cancer screening status†			
Meet guidelines	51.1	23.4** ± 1.9	18.1** ± 1.5
Do not meet guidelines	48.9	7.4 ± 1.2	8.7 ± 1.1
Missing (n)	356		
Mammography status			
Within last year	54.0	—	19.0** ± 1.6
Not within last year	46.0	—	6.9 ± 1.0
Missing (n)	206		

Table 1 Continued

	Frequency in Full Sample (N = 10,486) %	Prevalence of Having a Total Skin Examination in the Past Year	
		White Men n = 4454 % ± 95% CI	White Women n = 6032 % ± 95% CI
PSA test status			
Within last year	42.5	26.7** ± 2.4	—
Not within last year	57.5	8.1 ± 1.2	—
Missing (n)	252		
Skin cancer personal history			
No skin cancer	94.4	12.9** ± 1.1	12.0** ± 1.0
Melanoma	1.2	64.8 ± 11.6	40.6 ± 13.0
Nonmelanoma	2.9	50.0 ± 8.7	37.9 ± 8.4
Unknown type	1.5	55.8 ± 12.4	39.8 ± 12.8
Missing (n)	14		
Skin cancer family history			
No skin cancer	89.3	14.5** ± 1.2	12.7** ± 1.0
Melanoma	2.9	29.1 ± 10.3	17.9 ± 5.6
Nonmelanoma	3.7	32.3 ± 7.8	22.0 ± 5.4
Unknown type	4.1	20.1 ± 6.4	14.2 ± 6.2
Missing (n)	129		

CI = confidence interval; HMO = health maintenance organization; PSA = prostate-specific antigen. All percentages are weighted. Data Source: National Center for Health Statistics.

** $P < .001$, for the association between the variable and prevalence of having a total skin examination in the past year.

†Individuals were denoted as meeting colorectal cancer screening guidelines if they reported having a home-based fecal occult blood test within the past 12 months or endoscopy (flexible sigmoidoscopy or colonoscopy) within the past 10 years.

‡Estimate has low reliability (ie, coefficient of variation >30%).

There is equivocal evidence from prior studies about potential differences in total skin examination rates between men and women.^{13,14,21} We found men to have a significantly higher skin examination rate than women (16% and 13%, respectively), although the absolute difference in screening rates was small. Lower rates of skin examination screening were observed among those with a lower level of education. Given the poorer disease prognosis for individuals who are diagnosed with melanoma and have a lower socioeconomic status²² (who are more likely to have a lower level of education), comprehensive efforts to increase total skin examination rates are needed across population subgroups.

Results of the bivariate analyses indicated that reported skin examination screening rates were lower among both men and women with poorer health care access and coverage. However, these associations were no longer statistically significant in the multivariable analyses, suggesting that they were accounted for by other variables such as education level. Having a personal history of skin cancer was linked with a greater likelihood of having a skin examination in the past year for both men and women. However, from one third to more than half of these individuals did not have an examination in the past year, pointing out the need for regular ascertainment, documentation, prompting, and

education about personal history of skin cancer. Having a family history of skin cancer also was linked with a higher skin examination screening rate among men and women, although the rates were considerably lower than those for individuals with a personal history of skin cancer. Physicians should routinely recommend that their patients with a personal history of skin cancer discuss the importance of skin cancer screening with their family members. However, the vast majority of melanoma diagnoses occur in individuals without a family history of skin cancer.

Individuals who reported not having a past-year skin examination were more likely not to have been screened for colorectal, breast (among women), and prostate (among men) cancers. This may reflect general health care access barriers such as lack of insurance or underinsurance. These results also suggest the importance of physicians assessing patients' receipt of multiple cancer screenings, for example by including a comprehensive set of relevant questions on intake forms. Such assessments, and subsequent physician recommendations to undergo screening, also may be conducted as part of a cancer-related checkup during a general health examination,¹² particularly for patients with well-established risk factors for melanoma.²³ The use of chart prompts also may

Table 2 Sex-stratified Multiple Logistic Regression Analyses Examining Correlates of Having a Total Skin Examination in the Past Year, 2005 National Health Interview Survey

	White Men (n = 4075)		White Women (n = 5659)	
	aOR	95% CI	aOR	95% CI
Age (years)				
50-64	Ref**		Ref*	
65-79	1.61	1.27-2.03	1.44	1.18-1.77
≥80	1.52	1.06-2.19	1.12	0.86-1.48
Education level				
Some high school or less	0.42	0.30-0.59	0.51	0.37-0.69
High school graduate	0.51	0.39-0.67	0.55	0.42-0.71
Some college	0.57	0.44-0.75	0.84	0.67-1.06
College graduate	Ref**		Ref**	
Marital status				
Married/partnered	Ref			
Not married/partnered	0.85	0.66-1.09		
Source of preventive care				
Doctor's office or HMO	Ref		Ref	
Clinic/health center/other	0.71	0.52-0.97	0.73	0.55-0.98
None	1.20	0.65-2.21	0.23	0.06-0.92
Health care coverage				
Private	Ref		Ref	
Public	0.81	0.62-1.05	0.85	0.67-1.09
None	0.83	0.42-1.62	0.77	0.46-1.30
Colorectal cancer screening status†				
Meet guidelines	Ref**		Ref**	
Do not meet guidelines	0.46	0.35-0.60	0.68	0.57-0.81
Mammography status				
Within last year			Ref**	
Not within last year			0.39	0.32-0.48
PSA test status				
Within last year	Ref**			
Not within last year	0.35	0.27-0.46		
Skin cancer personal history				
No skin cancer	Ref**		Ref**	
Melanoma	11.34	6.26-20.54	5.00	2.67-9.38
Nonmelanoma	5.94	3.75-9.41	3.57	2.38-5.36
Unknown type	7.46	4.15-13.42	5.07	2.73-9.41
Skin cancer family history				
No skin cancer	Ref		Ref	
Melanoma	1.73	0.95-3.12	1.32	0.88-1.98
Nonmelanoma	1.66	1.02-2.71	1.34	0.92-1.95
Unknown type	1.26	0.79-2.02	0.94	0.51-1.73

aOR = adjusted odds ratio; CI = confidence interval; HMO = health maintenance organization; PSA = prostate-specific antigen; Ref = reference group. Data Source: National Center for Health Statistics.

P* < .01; *P* < .001, for the association between the variable and prevalence of having a total skin examination in the past year.

†Individuals were denoted as meeting colorectal cancer screening guidelines if they reported having a home-based fecal occult blood test within the past 12 months or endoscopy (flexible sigmoidoscopy or colonoscopy) within the past 10 years.

remind physicians to encourage patients at higher risk for melanoma to engage in skin self-examination and to report changes to existing moles or the development of new moles. Achieving widespread receipt of screening for multiple cancers will require systematic, coordinated efforts at all levels of the health care system, including providers, practices, and managed care organizations.

Limitations

Although self-reports of total skin examinations have been found to have high sensitivity,²⁴ participants' reported receipt of total skin examinations in the current study may not correspond with actual examinations performed by a physician. Further, participants were asked only about total skin examinations performed by a dermatologist or other physi-

cian, and thus skin examinations performed by other health care providers (such as nurses or advanced practice clinicians) are not captured. The cross-sectional nature of the study design precludes determination of the causal nature of observed associations.

CONCLUSIONS

Rates of having a total skin examination in the past year were low across all age/sex subgroups examined in this study. Physicians should be particularly aware of the need to consider skin cancer screening examinations for their male, elderly patients as well as individuals with less education. Lack of screening for skin cancer was associated with lack of screening for other cancers. There are likely multiple barriers to skin examination screening for physicians and their patients. Further research is needed to develop and test interventions that both increase patient awareness of the importance of periodic total skin examinations and promote physician delivery of such examinations.

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