

Prostate Cancer Screening Trends of New York State Men at Least 50 Years of Age, 1994 to 1997

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Background. Despite the lack of consensus on prostate cancer screening recommendations, men are being screened at high rates in some states. Our objective was to examine the trends in prostate cancer screening awareness and practices from 1994 through 1997 and the relationship among screening practices and demographic characteristics, perceived risk, and family history of prostate cancer.

Methods. Data from the New York State Behavioral Risk Factor Surveillance System surveys and questionnaire modules on prostate cancer screening were used for this study, which excluded men younger than 50 years of age and men with a history of prostate cancer. The questionnaires were administered by random-digit-dialed monthly telephone surveys of the civilian, noninstitutionalized adult population in New York State.

Results. A total of 295, 336, 273, and 448 men, the vast majority of whom were white, met the study criteria for 1994, 1995, 1996, and 1997, respectively. Each year the percentage of men who reported having heard of the prostate specific antigen (PSA) test increased (test for trend, $P < 0.001$). Among those who had heard of the PSA test, the percentage who reported having had a PSA test increased steadily from 1994 to 1997. About 30% of the men in each year's study did not have an impression of their risk of getting prostate cancer.

Conclusions. Given the increasing rate at which men are reporting being screened for prostate cancer and given their reported perceived risk levels, perhaps more needs to be done to educate men about screening implications and personal risk for prostate cancer.

Key Words: prostate cancer; screening; prostate specific antigen test; digital rectal exam.

INTRODUCTION

There are no published data on trends in prostate cancer screening or awareness. This study is the first to report on such short-term trends. The purpose of this study was to further examine prostate screening among New York State men, the trends in prostate cancer awareness and screening practices from 1994 through 1997, and the relationship between screening practices and certain sociodemographic characteristics and perceived risk of prostate cancer. For 1996, the study further examined the relationship between reported prostate cancer screening practices and reported family history of prostate cancer.

BACKGROUND

Prostate cancer is the second leading cause of cancer death among men. According to the American Cancer Society (ACS), in 2000 more than 180,000 new cases of prostate cancer will be diagnosed in the United States; an estimated 32,000 men will die of the disease [1]. Prostate cancer risk increases with increasing age and is higher among black men than among white men. The age-adjusted incidence is 142.0 per 100,000 for black men and 108.3 per 100,000 for white men [2,3]. The disease is rarely seen in men younger than 50 years of age. As documented by the National Cancer Institute's Surveillance, Epidemiology, and End Results program data for 1973 through 1995, among both black and white men, the incidence rates increased until 1993 after which they began to decline [4,5]. Specifically, there was a rise in the incidence of localized or regional cancer diagnoses and a fall in distant diagnosed disease. Despite these changes in incidence, the median age at

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diagnosis (72 years for white men and 70 years for black men) remained relatively stable from 1980 until about 1993, when it began to decrease slightly [6,7].

Researchers believe that the introduction of the prostate specific antigen (PSA) screening test in the late 1980s accounts for much of the increase in localized prostate cancer incidence [8]. The serum PSA test is prostate organ-specific; however, it is not prostate cancer specific. Men with elevated PSAs can have one of several benign prostatic conditions, including acute urinary retention, acute prostatitis, prostatic infarction or ischemia, or benign prostatic hyperplasia [9-11]. Despite its widespread use, the PSA test has limitations: reported sensitivities of 70 to 99% and specificities of 54 to 91% [11-13].

No consensus currently exists about recommendations for prostate cancer screening. For men at least 50 years of age who have at least a 10-year life expectancy, the ACS recommends an annual digital rectal examination (DRE) and a prostate specific antigen test. ACS also recommends that younger men who are at high risk be offered similar screening [14]. The recommendation from the American Urological Association [15] is quite similar to ACS guidelines. Among those in disagreement are the American College of Preventive Medicine and the United States Preventive Services Task Force, which state that routine screening for prostate cancer with DRE or PSA is not recommended [16,17]. The Task Force based its decision mainly on inconclusive evidence from studies of the effectiveness of screening tests in reducing prostate cancer morbidity or mortality. Although they will not be completed for many more years [18], several clinical trials are under way to evaluate the efficacy of prostate cancer screening.

Despite the lack of consensus on prostate screening recommendations, results from the 1994 and 1995 New York State Behavioral Risk Factor Surveillance System (BRFSS) found that men are reporting being screened at high rates [19]. Among the men in New York State who had heard of the PSA test (37%), 64% reported ever having had the test in 1 of those 2 years.

The purpose of this study was to further examine prostate screening among New York State men, the trends in prostate cancer awareness and screening practices from 1994 through 1997, and the relationship between screening practices and certain sociodemographic characteristics and perceived risk of prostate cancer.

METHODS

Information from the 1994 through the 1997 New York State BRFSS surveys and questionnaire modules on prostate cancer screening provided the basis for this study. BRFSS is a state-based system designed to collect information on modifiable health-related behaviors and

to monitor behavioral risk factors. The prostate cancer screening module was designed by the New York State Department of Health in conjunction with the Centers for Disease Control and Prevention to assess prostate-cancer-related knowledge, attitudes, and screening practices. BRFSS data are obtained from random-digit-dialed monthly telephone surveys of the civilian, noninstitutionalized, adult population (1994, $n = 2313$; 1995, $n = 2477$; 1996, $n = 2188$; 1997, $n = 3403$) [20]. Sample weights were constructed to compensate for unequal probabilities of selection and to adjust the sample to the age, sex, and racial distribution of the New York adult population.

The current study includes men at least 50 years of age with no reported prostate cancer history in 1994, 1995, or 1996. Data on prostate cancer history were not collected in 1997. Demographic variables included the respondent's educational attainment (high school graduate or less, at least some college or technical school), age (50 to 64 years of age, 65 years or older), health plan coverage (yes, no), and race (black, white, other). Most of the men in the sample were white or black. Thus, the low numbers of men in the other racial categories were excluded from data analysis.

Prostate cancer awareness and screening variables included the respondent's perceived chances of getting prostate cancer. ("In terms of your own risk, what would you say your chances are of getting prostate cancer?" Responses: high, medium, low, none, don't know/not sure.) If the respondent had "ever heard about the PSA blood test" he was then asked whether he was told by a physician to have the test and whether he had had the test. Men were also asked whether they were told by a physician to have a DRE and whether they had had the examination. Questions about the DRE were not asked in the 1997 survey.

The 1996 survey data were used in a subanalysis because that year the survey included additional questions regarding family history of prostate cancer. Family history was assessed by whether a first-degree relative (i.e., a father, brother, or son) reportedly had prostate cancer (yes, no). For the subanalysis of 1996 data, we used only data on men at least 50 years of age who had no history of prostate cancer and who responded yes to the question "Have you ever heard about the PSA blood test?". For the question regarding a respondent's perceived chances of getting prostate cancer, responses in the "high" and "medium" and the "low" and "none" categories were combined to improve statistical power.

Weighted prevalence and standard error estimates for demographic variables from the main questionnaire, as well as for prostate cancer screening variables from the module, were calculated using SUDAAN software. This was done to account for the complex multistage cluster sampling design of the BRFSS [21,22]. Tests for

trend were conducted by using the logistic procedure in SUDAAN (year was the sole independent variable in the model with the variable of interest as the outcome).

Using Pearson's χ^2 test, relationships between independent categorical variables and whether the respondent reported having been screened for prostate cancer were explored by cross tabulations of only the 1996 data. Finally, a logistic regression analysis was conducted to model prostate cancer screening. For this analysis, we combined into one variable the positive responses to either of two questions: "Have you ever been told by a physician that you should have a PSA blood test to check for prostate cancer?" or "Have you ever been told by a physician that you should have a digital rectal exam?"

RESULTS

Using the Council of American Survey Research Organization's method [23], we found response rates of 61, 60, 51, and 52% for 1994, 1995, 1996, and 1997, respectively. A total of 302 men at least 50 years of age were interviewed in 1994, 342 in 1995, 279 in 1996, and 448 in 1997. Men who reported a history of prostate cancer were excluded from the study, leaving 295 for 1994, 336 for 1995, 273 for 1996, and 448 for 1997. For the subanalysis of 1996 data, 185 men at least 50 years of age without a history of prostate cancer reported having heard of the PSA test.

For the years 1994 to 1997, men 50 to 64 years of age made up between 55 and 57% of the study populations (Table 1). The median age in years of respondents for

each year was 64 (1994), 65 (1995), 64 (1996), and 64 (1997) (data not shown). The vast majority (82 to 86%) of respondents were white. The percentage of those reporting completion of at least 1 to 3 years of college or some technical school increased from 42% in 1994 to 54% in 1997 (test for trend, $P < 0.01$). Nearly all respondents for years 1994 through 1997 had some form of health insurance (Table 1). When asked whether they agreed with the statement "I would want to have special tests to find out early if I had prostate cancer," most men (70–77%, depending on the year) strongly agreed (data not shown). There were no significant differences between either educational level or year of survey and strongly agreeing with the above statement. The question was not asked in 1997. The percentage of New York State men who reported having heard of the PSA test increased each year (test for trend, $P < 0.001$) (Table 2).

From 1994 through 1997, a respondent's perceived chances of getting prostate cancer varied little (Table 2). The percentage of men who thought their chances of getting prostate cancer were low increased from 21% in 1994 to 31% in 1997 while the proportion who felt they had no chance of getting it decreased by about 8 percentage points (test for trend not significant).

Among men who had heard of the PSA test, there was a steady increase in the percentage who were reportedly told by a physician that they should have the test (58% in 1994 to 77% in 1997, test for trend, $P < 0.001$) and who had reportedly ever had a PSA test (62% in 1994 to 77% in 1997, test for trend, $P < 0.001$) (Table 2). Increases during the study period were also seen for

TABLE 1

Demographic Characteristics of New York State Men at Least 50 Years of Age^a Who Participated in the BRFSS^b Prostate Module, 1994 through 1997

Factor	1994		1995		1996		1997	
	n ^c	% ^d						
Total	295		336		273		448	
Age (years)								
50 to 64	168	(57.1)	188	(55.1)	157	(56.5)	248	(54.9)
65 or older	127	(42.9)	148	(44.9)	116	(43.5)	200	(45.1)
Race								
Black	34	(10.8)	32	(9.7)	29	(13.5)	40	(11.4)
White	249	(85.3)	292	(85.7)	239	(82.4)	393	(83.7)
Other	12	(3.9)	12	(4.4)	5	(4.2)	15	(4.9)
Education								
High school or less	173	(57.6)	176	(53.5)	128	(50.1)	199	(45.8) ^e
1–3 years of college or more	121	(42.4)	159	(46.5)	143	(49.9)	249	(54.2)
Health plan coverage								
Yes	277	(94.1)	320	(96.0)	261	(93.5)	419	(94.1)

^a 1997 data may include men with a history of prostate cancer.

^b Behavioral Risk Factor Surveillance System.

^c Numbers may not add to total due to missing or refused.

^d Weighted percent. Percents may not total to 100% because of rounding.

^e Test for trend, $p \leq 0.003$.

TABLE 2

Self-Reported Prostate Cancer Awareness, Screening Practices, and Family History of Prostate Cancer among New York State Men at Least 50 Years of Age^a 1994 through 1997, BRFSS^b

Factor	1994			1995			1996			1997		
	n ^c	% ^d	95% CI ^d	n ^c	% ^d	95% CI ^d	n ^c	% ^d	95% CI ^d	n ^c	% ^d	95% CI ^d
Total	295			336			273			448		
Self-perceived risk ^e												
High	29	9.4	(6.0–12.9)	27	8.0	(4.9–11.0)	24	8.6	(5.1–12.2)	38	8.3	(5.6–11.1)
Medium	58	21.0	(15.9–26.1)	68	20.1	(15.3–24.9)	55	19.8	(14.5–25.0)	92	20.3	(16.3–24.4)
Low	59	20.7	(15.4–26.0)	79	22.8	(17.8–27.8)	67	24.4	(18.4–30.4)	134	30.5	(25.7–35.4)
None	53	19.1	(13.9–24.3)	51	16.9	(12.1–21.7)	41	14.5	(9.9–19.1)	53	10.8	(7.7–13.8)
Don't know/not sure	90	29.8	(24.1–35.5)	109	32.2	(26.6–37.9)	85	32.7	(26.5–39.0)	129	30.0	(25.4–34.7)
Heard of PSA test												
Yes	157	52.4	(45.8–59.0)	197	59.6	(53.6–65.7)	185	67.2	(60.8–73.5)	323	73.4	(69.0–77.7) ^f
No	131	47.6	(41.0–54.2)	134	40.4	(34.4–46.4)	87	32.9	(26.5–39.2)	124	26.7	(22.3–31.0)
Told by MD should have PSA test ^g												
Yes	93	58.2	(49.8–66.5)	129	65.7	(58.2–73.1)	125	66.3	(59.0–76.6)	237	76.9	(72.1–81.7) ^f
Ever had a PSA test ^g												
Yes	96	61.8	(53.5–70.2)	126	68.9	(57.9–72.6)	130	68.9	(61.6–76.2)	241	77.2	(72.3–82.2) ^f
Told by MD should have a DRE ^h												
Yes	115	70.8	(62.8–78.8)	75	73.7	(64.5–82.8)	148	78.4	(71.6–85.2)	^A		
Ever had DRE ^h												
Yes	134	83.1	(76.2–90.0)	154	88.7	(83.9–93.6)	154	82.5	(76.3–88.6)	^A		
First-degree relative with prostate cancer ⁱ												
Yes	^A			^A			19	10.5	(5.6–15.3)	^A		

^a 1997 data may include men with a history of prostate cancer.

^b Behavioral Risk Factor Surveillance System.

^c Numbers may not add to total due to missing or refused.

^d Weighted estimates. Confidence interval.

^e Self-perceived chance of getting prostate cancer.

^f Men who had heard of the prostate specific antigen (PSA) blood test.

^g Digital rectal examination.

^h Question not asked.

ⁱ Test for trend, $P \leq 0.001$.

those who reported having been told by a physician to have a DRE (71% in 1994 to 78% in 1996, test for trend not significant) but not for those who had ever had a DRE (83% in 1994 and 1996). In 1996, 11% of the respondents who had heard of the PSA test reported that a first-degree relative, i.e., a father, brother, or son, had prostate cancer (Table 2).

In 1996 a total of 185 men (67%) at least 50 years of age who reported no history of prostate cancer reported having heard of the PSA test. Among these men, having been screened for prostate cancer was associated with having been told by a physician to have a PSA test ($P < 0.001$) or a DRE ($P < 0.001$) (Table 3). Specifically, men who had been told by a physician to have either test were more likely to report having been screened for prostate cancer than were men whose physicians did not tell them to get screened. All men with first-degree relatives ($n = 19$) who had prostate cancer reported having been screened. There were no reported

screening differences by race, age, education, or insurance status.

In 1996 men at higher risk for prostate cancer (reported family history of prostate cancer, black, 65 years or older) reported a high perceived risk for the disease, but none of the differences was significant. Men told to have a PSA test or a DRE by a physician ($n = 170$) and who reported having been screened numbered 159 (97.8%, 95% CI (95.0–100.5)) (data not shown). Logistic regression results support the findings from the univariate analysis. However, because of the small cell sizes and unstable estimates, the results are not presented here.

DISCUSSION

Our results show that among New York State men older than 50 years who had heard of the PSA test, the percentage who had had a PSA test significantly

TABLE 3

Self-Reported Screening Status in Relation to Awareness, Family History of Prostate Cancer, and Demographic Characteristics for New York State Men at Least 50 Years of Age^a Who Had Heard of the Prostate Specific Antigen (PSA) Blood Test (*n* = 185), 1996 BRFSS^b

Factor	<i>n</i>	Ever screened for prostate cancer ^c		
		Number screened ^d	% ^e (<i>p</i>)	95% CI ^f
Age (years) (<i>n</i> = 185)				
50 to 64	101	92	92.1 (0.95)	(86.9, 97.3)
65 or older	84	78	91.8	(85.3, 98.4)
Race (<i>n</i> = 182)				
Black	17	15	92.6 (0.87)	(81.9, 103.3)
White	165	152	91.6	(87.0, 96.2)
Education (<i>n</i> = 185)				
High school or less	75	70	93.1 (0.64)	(87.2, 98.9)
1-3 years of college or more	110	100	91.1	(85.3, 96.9)
Health plan coverage (<i>n</i> = 185)				
Yes	178	164	92.1 (0.79)	(87.9, 96.3)
No	7	6	89.2	(68.2, 110.2)
Self-perceived risk ^g (<i>n</i> = 185)				
High, medium	66	59	89.1 (0.54)	(81.2, 97.0)
Low, none	73	69	94.5	(89.1, 99.9)
Don't know/not sure	46	42	92.0	(83.2, 100.7)
Told by MD should have PSA test (<i>n</i> = 185)				
Yes	125	124	99.6 (<0.001)	(98.7, 100.4)
No, don't know	60	46	77.5	(66.2, 88.8)
Told by MD should have DRE ^h (<i>n</i> = 185)				
Yes	148	146	97.9 (<0.001)	(95.0, 100.9)
No, don't know	37	24	70.5	(55.1, 85.9)
First degree relative with prostate cancer (<i>n</i> = 185)				
Yes	19	19	100.0 (<0.01)	(100.0, 100.0)
No	166	151	91.1	(86.4, 95.7)

^a With no reported history of prostate cancer.

^b Behavioral Risk Factor Surveillance System.

^c Either by prostate specific antigen test or by digital rectal examination.

^d Numbers may not add to total due to missing or refused.

^e Weighted estimates. Confidence interval.

^f Self-perceived chance of getting prostate cancer.

^g Digital rectal examination.

increased from 1994 through 1997. As expected, also on the increase was the proportion of men whose physicians told them that they should have a PSA test or a DRE. These increases, attributed possibly to increased awareness of the PSA test, are to be expected given national trends of decreased average age at diagnosis [24]. In 1996, however, those who reported having had a DRE decreased to 83% from 89% in 1995. Although reported ever PSA test usage in our study did not change from 1995 to 1996, it increased dramatically in 1997. What may be affecting screening rates in the New York population is patient interest in screening. However, our data strongly support the role the physician plays in the likelihood of being screened. Wolf and colleagues found that patients less informed about prostate cancer screening are more likely to be interested in being screened than patients who received informed consent discussion about PSA screening [25].

However, having attained a higher educational level

does not necessarily translate into being more interested in prostate cancer screening. Bratt et al. [26] found that less educated men (less than 12 years of education) were more interested than better educated men in knowing whether prostate cancer is inherited and in getting screened. Our results indicate that although those less educated in the New York population were slightly more likely to have been screened for prostate cancer (not significant), they were not more likely to want to be screened to find out early if they had prostate cancer (strongly agree with the statement "I would want to have special tests to find out early if I had prostate cancer.>").

The BRFSS data are weighted to the age, sex, and race (white vs non-white) distribution of adults in New York State based on the most current population projections. Therefore, the weighted percentages reported in Table 1 are reflective of the demographics of New York State adults. However, education is not part of the

weighting methodology. In fact, in 1997 the New York State BRFSS adult population has a higher level of educational attainment than does the US Bureau of the Census estimate for the state adult population [27]. This fact could lead to biased estimates. However, the rates of reported screening would likely still be quite high.

According to the results of this survey, regardless of age, race, education, health plan coverage, reported family history, or whether the physician recommended a screening test, a very high proportion of New York State men are reporting being screened for prostate cancer. This leads one to surmise that these factors are not being considered in the decision to screen by either the physician or the patient. Before deciding to screen, are doctors talking to patients about the implications of a positive screen? Do patients understand the consequences of a positive screen in terms of costs, potential treatment choices, and possible morbidity outcomes? More needs to be learned about patients', particularly elderly patients whose disease tends to be less aggressive, understanding of these implications.

Our data also show that perceived risks have not changed much; about 30% still do not have an opinion of their risk, and 1 in 10 feels he has no risk. Despite the increased use of screening tests, the percentage of men who think their chances of getting prostate cancer are low appears to be increasing in New York State. This could be attributable to few established prostate cancer risk factors (black [2], older [2], positive family history [28,29]). It is known that men with a family history of the disease have two to five times the risk of developing prostate cancer than have men with no relatives affected [30,31]. Consistent with published data, the men in our study with a reported family history of prostate cancer are reporting being screened at higher rates than are those with no known family history, although screening among both groups is high. The population-based prevalence of a history of prostate cancer among first-degree relatives in other studies varied between 5 and 11% [32]. Our study estimate of New York State men who had heard of the PSA test and had a first-degree relative with prostate cancer falls within this range, although our sample size is small. Also in New York, black men are reporting being screened at higher rates than white men. They are known to have a 60% higher prostate cancer incidence rate than white men have and a 130% higher mortality rate [4].

Despite national estimates indicating that greater than 75% of all prostate cancers are diagnosed in men older than 65 years [1], these men are reporting being screened at about the same rates as are younger men (50 to 64 years of age) in New York. This may be explained by the widespread use of the PSA test and a lack of consensus on recommendations for its use.

The current study has several limitations, the most

important being a low response rate by people with telephones (51 to 61%). This compares with a median response rate of 62% reported by Massey et al. [33] in their analysis of 39 random-digit-dialed telephone surveys. However, since we did not attempt to assess the affect of nonresponse, results should be interpreted with this weakness in mind. Another limitation is the small sample size, which resulted in wide 95% confidence intervals. The 1996 BRFSS module on prostate cancer included questions on family history, but the 1994, 1995, and 1997 modules did not. Because the numbers are small for 1996, the subanalysis results have wide 95% confidence intervals. Although the intervals do not always include 1, a much larger sample size is preferable to obtain more stable prevalence estimates. Another limitation is that people without telephones (estimated at 5% in 1997 for New York State [34]) were excluded.

Given the self-reported nature of the survey, information bias is another limitation. We have not assessed the accuracy of the subjects' self-reports. However, several studies have measured the accuracy of time-limited recall of cancer screening tests. Studies that used telephone surveys and assessed recall of a Papanicolaou test, mammography, or a DRE (all more memorable than a PSA test) in the past 2 years reported sensitivities ranging from 69% for men who received a DRE to 99% for women who received a mammogram [35-37]. Since our respondents were asked whether they had ever been screened for prostate cancer, the validity of our findings is unknown and cannot be directly compared to other studies which measured the accuracy of patients' recall of cancer screening tests within the past 1 to 2 years.

Two additional studies have measured the accuracy of patient reports of family history of cancer [38,39]. They found that between 83 and 97% of reports were accurate. Higher accuracy rates were achieved for first-degree relatives (compared with second) and self-referred patients (compared with randomly selected). The 1997 data do not exclude men with a history of prostate cancer, perhaps overestimating the percentage of men who reported having been screened for prostate cancer (compared with other estimates in Tables 1 and 2). Finally, this study does not address the frequency of screening. The respondents were asked whether they had ever been screened for prostate cancer, not whether they had been screened within the previous year or two.

In the absence of national surveillance data to monitor trends in prostate cancer screening, this study provides the first known (to the authors) report on the short-term trends of prostate cancer screening rates and associated factors in a large state. New York is one of the few states where prostate cancer screening data are available over time on a population basis. At this point, with the rates of ever having been screened (DRE

or PSA test) at greater than 90% for men who have heard of the PSA test (Table 3) (for 1994 to 1996 we excluded those with a reported history of prostate cancer so we are probably slightly underestimating the percentage of the total population who has ever been screened for prostate cancer), it may be time to move to surveillance of recent screening (during the previous 1 or 2 years) or the frequency of screening to monitor and assess trends in awareness and screening.

Notwithstanding the controversy surrounding the PSA test, men 65 or older in New York State are reporting high rates of having been screened for prostate cancer. As evidenced by the respondents' perceived risk of prostate cancer, more needs to be done to educate men about personal risk, especially black men (1996, 12% report a high perceived risk of prostate cancer). And more information is needed on how variables such as patient educational level, age, race, family history, cost, possible subsequent morbidity, and physician influences (such as education and counseling of patients) affect who gets screened.

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