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Clinician Factors Associated with Prostate-Specific Antigen Screening in Older Veterans with Limited Life Expectancy

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Abstract

Importance—Despite guidelines recommending against prostate-specific antigen (PSA) screening in elderly men with limited life expectancy, PSA screening remains common.

Objectives—Identify clinician characteristics associated with PSA screening in older veterans stratified by life expectancy.

Design and Setting—Cross-sectional study in the VA healthcare system.

Participants—826,286 veterans aged ≥65 years eligible for PSA screening that had VA laboratory tests performed in 2011.

Main Outcomes and Measures—The primary outcome was the percentage of men with a screening PSA in 2011. Limited life expectancy was defined as age ≥85 with Charlson comorbidity score ≥1 or age ≥65 with Charlson comorbidity score ≥4. Primary predictors were clinician characteristics including degree-training level, specialty, age, and gender. We performed log-Poisson regression models for the association between each clinician characteristic and PSA screening stratified by patient life expectancy and adjusted for patient demographics and clinician clustering.

Results—In 2011, 56% of older veterans received PSA screening, including 39% of the 203,717 men with limited life expectancy. After adjusting for patient demographics, higher PSA screening in patients with limited life expectancy was associated with having a clinician who was an older male and was no longer in training. PSA screening ranged from 27% for men with a physician trainee to 42% for men with a physician attending ($p < 0.0001$); 22% for men with a geriatrician to

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Conflict of Interest: None

Contributions: Dr. Tang was responsible for all aspects of the study; Dr. Walter, Dr. Sudore, Dr. Wong, Ms. Tan, and Ms. Espaldon were involved in study design and critical revision of the manuscript; Dr. Shi and Ms. Fung were involved in statistical study design, analysis and critical revision of the manuscript.

82% for men with a urologist as their clinician (p <0.0001); 29% for men with a clinician ≤35 years old to 41% for those with a clinician ≥56 years old (p <0.0001); and 38% for men with a female clinician older than 55 years versus 43% for men with a male clinician older than 55 years (p=0.0008).

Conclusion and Relevance—Over a third of men with limited life expectancy received PSA screening. Men whose clinician was a physician trainee had substantially lower PSA screening than those with a physician attending, nurse practitioner or physician assistant. Interventions to reduce PSA screening in older men with limited life expectancy should be designed and targeted to high screening clinicians – older male, non-trainee clinicians—for greatest impact.

Introduction

The U.S. Preventive Services Task Force (USPSTF), American Cancer Society, and American Urological Association agree that prostate specific antigen (PSA) screening in men with limited life expectancy should be avoided.[1-3] In 2008, USPSTF specifically revised its guidelines to recommend against performing PSA screening in men aged ≥75 years and, in 2012, USPSTF recommended against PSA screening in men of all ages.[1] While survival benefit from PSA screening is unlikely in men with limited life expectancy, this remains uncertain in men with favorable life expectancy and many guidelines recommend individualized decision-making in these men. Potential screening harms include physical and psychological adverse events from follow-up procedures and treatments (e.g. infection, incontinence, impotence) and are more likely among men in poor health.[4] Yet many older men, including those with limited life expectancy, continue to receive PSA screening.[5]

Men are more likely to receive PSA screening when recommended by or routinely ordered by their clinician. Therefore, interventions to reduce PSA screening will be most effective if specifically designed and targeted to high-screening clinicians.[6,7] Prior literature suggests PSA screening rates are highly variable across clinicians, but these studies have been limited to specific regions of the country and have not considered patient life expectancy.[8,9] Also, it is unknown what type of clinicians are ordering the greatest number of PSA screening tests in older men, especially in those with limited life expectancy. Understanding clinician characteristics associated with PSA screening in men with limited life expectancy would help in designing targeted interventions for high screening clinician groups.

This study aims to identify clinician characteristics associated with higher PSA screening in older men with limited life expectancy where there is guideline consensus that PSA screening should be avoided. We contrast this with PSA screening in men with favorable life expectancy for whom many guidelines still recommend individualized decision-making.

Methods

Data Sources and Patients

Using the national Veteran Affairs (VA) healthcare system, we identified a cohort of screen-eligible men aged ≥65 on 1/1/11 with at least one outpatient VA visit in 2010 or 2011 and at least one laboratory test result in 2011 at 1 of the 130 VA facilities. Men who underwent

PSA screening between 1/1/11 to 12/31/11 were linked to the clinician who ordered their first PSA test in 2011. Men who did not receive a PSA test in 2011 were linked to the clinician who ordered the majority of their VA outpatient labs in 2011. Data were collected from the VA Corporate Data Warehouse (CDW) and National Patient Care Database.

From these data sources, we identified 1,743,993 men aged ≥65 who met the inclusion criteria (Figure 1). We did not include men who did not receive any labs in the VA healthcare system in 2011 since they could not be linked to a VA clinician and data on non-VA clinicians were not available. We then excluded men enrolled in a Medicare HMO in 2010 or 2011 because they lacked claims data used for exclusions. For example, men with a history of prostate cancer, prostatectomy, androgen deprivation therapy, and elevated PSA result were excluded to ensure that the index VA PSA test in 2011 was for screening purposes. Men with symptoms suggestive of possible prostate cancer (e.g. hematuria, urinary obstruction, prostatitis, unexplained weight loss, back pain, other disorders of the prostate) within 3 months prior to their index PSA result were also excluded since their PSA testing was likely for diagnostic purposes rather than screening. Men with a PSA result in Medicare in 2011 prior to their index VA PSA test were also excluded because the VA PSA test may have been a follow-up to of an abnormal PSA in a non-VA setting. Our final screen-eligible cohort included 826,286 men.

Data Collection and Measurement

Outcome Variable—We assessed receipt of PSA screening during 2011 within the VA healthcare system. PSA screening was identified by the presence of a PSA test in the 2011 VA CDW database through the use of Logical Observation Identifiers Names and Codes (LOINC; 15325-4, 15323-9, 19195-7, 2857-1, 35741-8, 19197-3, 53764-7). LOINC are used to identify laboratory tests and are endorsed by the Department of Defense to standardize laboratory test labeling.[10,11] To confirm completeness of our PSA data, we also queried an independently extracted Decision Support System National Data Extracts Laboratory Results Data Set and 100% of PSA tests from our cohort were present in this confirmatory second dataset.

Receipt of PSA screening was assessed for the overall cohort and two subgroups: men with limited life expectancy and men with favorable life expectancy. Life expectancy was determined by age and the Charlson Comorbidity Index, which is a summary measure of 19 chronic diseases selected and weighted according to their association with mortality.[12] We used the Deyo adaptation of the Charlson Comorbidity Index, which was calculated from VA and Medicare inpatient and outpatient claims during the 12 months prior to 1/1/2011.[13,14] Men were categorized as having a limited life expectancy if they were aged ≥85 with a Charlson score ≥1 or aged ≥65 with a Charlson score ≥4. Men were categorized as having a favorable life expectancy if they were aged 65-74 with a Charlson score of 0. These categories identify one group with limited life expectancy (<5 years) for whom all guidelines have consistently recommended against PSA screening and another group with favorable life expectancy (> 10 years) for whom some guidelines recommend offering PSA screening based on individualized decision making.

Predictor Variables—Our main predictor variables focused on characteristics of the ordering clinicians. Clinician characteristics obtained from CDW Demographics included 1) degree-training level: physician trainee, physician attending, nurse practitioner (NP), physician assistant (PA), or "other degree", such as nurse, social worker, pharmacist, or nutritionist; 2) specialty: general medicine, geriatric medicine, other medicine subspecialty, urology, non-urologic surgery, or "other specialty" such as anesthesiology or psychiatry; 3) age: ≤35, 36-45, 46-55, ≥56 years; and 4) gender: male or female. Gender was imputed for the 16% of clinicians missing gender in CDW using http://genderize.io/ to determine whether the name had greater than a 50% likelihood of gender association.

In addition to patient age and comorbidity, we measured patient demographics known to influence cancer screening, including race/ethnicity and marital status, using VA and Medicare data. We used linkages to the 2010 U.S. Census to determine the percentage of adults with a college education and the median income for adults aged ≥65 in each patient's zip code tabulation area.

The Committee on Human Research at the University of California, San Francisco and the Committee for Research and Development at the San Francisco VA approved this study.

Statistical Analysis

According to clinician characteristics, we determined the percentage of men who received PSA screening among the overall cohort, those with limited life expectancy, and those with favorable life expectancy. For men with limited life expectancy, we used log-Poisson regression models with fixed effects to determine associations between clinician and patient characteristics with receipt of PSA screening. We used log-Poisson models to estimate unadjusted and adjusted risk ratios and used 99% confidence intervals given our large sample size. We adjusted for patient age, race, marital status, income, and education and for clinician clustering. Because 22% of clinicians were missing age, mostly from physician trainees, we performed multivariate imputation using chained equations method for all missing values to calculate adjusted risk ratios with 99% confidence intervals in our multivariate analysis. Sensitivity analysis showed adjusted risk ratios were similar with and without the use of imputed age of the clinician. Based on prior literature, we checked an interaction effect between clinician age and gender.[8] All analyses were performed using SAS® version 9.2 and Stata version 10 statistical software packages.

Results

Baseline Characteristics

Characteristics of the 826,286 men in our cohort are presented in Table 1 (mean age 74 ± 8, 87% White). 65% of men had a physician attending and 9% had a physician trainee. 84% of the men had a general medicine clinician and 37% had a clinician aged ≥55 years. A total of 40,631 unique VA clinicians were identified and linked to the men in our cohort as the clinician who ordered the index PSA test or the majority of their labs in 2011.

PSA Screening Rates in Overall Cohort

In 2011, 56% of men aged ≥65 received PSA screening in the VA healthcare system. 43% of men with a physician trainee had PSA screening as compared with 58% of men with a physician attending (Table 2). Men with a geriatric medicine clinician received PSA screening at a lower rate as compared to those with a general medicine clinician (32% vs. 58%, p<0.0001). 58% of men with a non-urologic surgeon had PSA screening while men with a urologist had PSA screening more frequently (86%). However, urologists only represented 0.1% of the clinicians. Men with a younger clinician had less PSA screening than men with an older clinician (46% for clinicians ≤35 vs. 57% for clinicians ≥56; p<0.0001). Men with a female clinician had less PSA screening than those with a male clinician (56% vs. 57%, p<0.0001).

PSA Screening According to Life Expectancy

Men with limited life expectancy received less PSA screening than men with favorable life expectancy (39% vs. 77%, p<0.0001). This difference was true across all clinician characteristics (Figure 2). Regardless of life expectancy, men with physician trainees had the lowest PSA screening whereas men with physician attendings had the highest PSA screening.

Among men with a limited life expectancy, even after adjusting for all patient and clinician characteristics in Table 1, men with a physician attending had higher PSA screening than men with a physician trainee (adjusted RR=1.65, 99% CI: 1.53, 1.77) (Table 3). Also, those with an NP or PA were more likely to receive PSA screening than those with a physician trainee (Table 2). PSA screening among men with limited life expectancy was higher if their clinician specialized in urology (adjusted RR = 3.06, 99% CI: 2.14, 4.38) or surgery (adjusted RR = 1.54, 99% CI: 1.32, 1.79) as compared to geriatric medicine. In addition, an age-gender interaction effect existed: PSA screening was higher in patients with older male clinicians versus older female clinicians (see eFigure 1 in the Supplement).

Many of the same clinician characteristics associated with PSA screening among men with limited life expectancy also predicted higher PSA screening among men with favorable life expectancy. An exception was seen in the similar percentages of men with favorable life expectancy who were screened regardless of whether their clinician specialized in surgery or geriatric medicine (65% vs 64%, p=0.23).

Discussion

PSA screening remains common in the VA healthcare system across numerous clinician characteristics and across the spectrum of patient life expectancy. Over one third of men with limited life expectancy received PSA screening in 2011 despite recommendations against PSA screening in this population. While all clinicians screened fewer men with limited life expectancy than men with favorable life expectancy, among men with limited life expectancy, several clinician characteristics were associated with higher use of PSA screening: being a non-trainee, a non-geriatrician, and an older male clinician. Among men with favorable life expectancy, being a non-trainee and older clinician also predicted higher

use of PSA screening but medical specialty was no longer correlated. Physician trainees had the lowest PSA screening among both patients with limited life expectancy and patients with favorable life expectancy even after adjusting for patient and clinician characteristics.

We previously examined PSA screening in 2003 in a similar veteran population and found that 56% of men aged ≥ 70 received screening.[15] The decrease in PSA screening over time from 56% in 2003 to 46% in 2011 among veterans aged ≥ 70 may have resulted from VA initiatives to discourage PSA screening among men who are unlikely to benefit. These initiatives included removal of electronic PSA screening reminders and implementation of quality improvement teams to reduce PSA screening among men with limited life expectancy. Similar to findings in the VA setting, the nationally representative National Health Interview Survey conducted in 2010 and 2013 also found a decrease in routine PSA screening in men 75 years old and older, from 44% to 37%, respectively.[16] This decrease in PSA screening may be reflective of changes in guidelines and the press becoming less favorable to PSA screening over time. For example, the recent Choosing Wisely educational campaign lists PSA screening in men ≥75 as a test that should generally not be performed.[17] Overall, the VA and non-VA health care sectors have taken initiatives to decrease PSA screening. However, our study shows that over one third of men with limited life expectancy received PSA screening in 2011 despite the lack of benefit and increase harm seen in this population.

To better understand clinician characteristics associated with PSA screening among men with limited life expectancy, we examined the impact of clinician degree, trainee status, medical specialty, age, and gender. To our knowledge, this study is the first to evaluate clinician characteristics associated with PSA screening in both men with limited life expectancy and men with favorable life expectancy. Prior studies evaluating the association between clinician characteristics and PSA screening have not included estimated patient life expectancy. Also, prior studies have shown conflicting results about the association between a clinician's training level and PSA screening. Our national VA study found that among men with limited life expectancy, men whose clinician was a physician trainee were less likely to receive PSA screening than men whose clinician was no longer in training (e.g., physician attendings, NPs, PAs). A study of New England Regional VA centers in 2007 found no significant difference between the screening rates of physician trainees as compared to physician attendings, whereas a Taiwanese study in 2008 found physician trainees ordered PSA screening more often than physician attendings.[8,18] The difference in these findings may be attributable to differing cultures across different countries and time periods with regards to training and PSA screening practices.[18] More recently trained physician trainees are likely guided by the newer 2008 and 2012 USPSTF guidelines, which have been progressively less favorably towards PSA screening, than physician attendings who trained under different guidelines. Because of this, physician trainees do not believe PSA screening tests are advantageous as compared to physician attendings and are less likely to order PSA screening tests.[19] Also, attending clinicians have likely seen more men diagnosed with prostate cancer and trust their clinical experience with prostate cancer screening and diagnosis over current screening guidelines.[20]

In addition to considering patient life expectancy, our study is the first study to compare PSA screening among patients with geriatricians versus those who have clinicians in other fields, such as general medicine and surgery. Our study found that PSA screening was lowest among men with a geriatrician compared with clinicians in other specialties. While it is known that urologists order PSA screening more often than primary care clinicians, our findings also showed a difference in PSA screening between clinicians specializing in geriatric medicine and general medicine.[21] This finding may be due to a higher self-selection of men who do not want PSA screening among those who choose to see geriatricians or a difference in practice styles between geriatricians and general internists.

In our study, men with limited life expectancy seen by older male clinicians were more likely to receive PSA screening than men seen by younger male and older female clinicians. These results are similar to the findings of a 2007 study of New England Regional VAs. [8] Also, several studies have demonstrated the inverse relationship between the number of years that a physician has been in practice and their adherence to standards of practice in the use of screening tests and preventive health care.[22] These findings may be due to changes in practice guidelines over the past decade that have become less favorable to PSA screening and represent a clinician cohort effect. However, we did not see the expected trend in PSA screening for female clinicians differing by age. The clinician age-gender interaction may be specific to PSA screening.

While our study has strengths in being a large national study that incorporates estimates of patient life expectancy, there are limitations. First, these data may not be generalizable to non-veterans. However, the VA healthcare system is the largest healthcare system for older men in the U.S. and is important to study in its own right. Also, data from 2011 may not reflect current screening practices after new USPSTF guidelines were released in 2012 recommending against PSA screening in all men. However, no significant decrease in PSA screening was seen after the 2008 change in USPSTF guidelines recommending against screening men age 75 and older. [23] Lastly, despite our exclusion criteria, some men in our final cohort may have received PSA testing for non-screening reasons. For example, presumably men seen by urologists have a genitourinary problem so the 184 PSA tests in our cohort ordered by these clinicians may actually represent non-screening tests, even though no prostate problem or symptom was coded in VA or Medicare claims data. However, the exclusion of these tests as non-screening PSA tests did not affect our findings.

In summary, PSA screening in men with limited life expectancy is still common and associated with several clinician characteristics. Educational interventions and performance measures discouraging screening in men with limited life expectancy that are specifically designed and targeted to help clinicians who are the highest utilizers of PSA screening—older non-trainee clinicians not specialized in geriatric medicine—will likely have the greatest impact in reducing PSA screening in older men with limited life expectancy.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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The corresponding author, Victoria Tang, had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs.

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Key points

Question: What clinician factors are associated with PSA screening in older veterans with limited life expectancy?

Findings: In this cross-sectional study that included 203,717 men with limited life expectancy, higher PSA screening rates were associated with having a clinician who was a physician attending (42%), a urologist (82%), ≥56 years old (41%), and male (40%).

Meaning: Interventions to reduce PSA screening in older men with limited life expectancy should be designed and targeted to high screening clinicians – older male, non-trainee clinicians not specialized in geriatric medicine—for greatest impact.

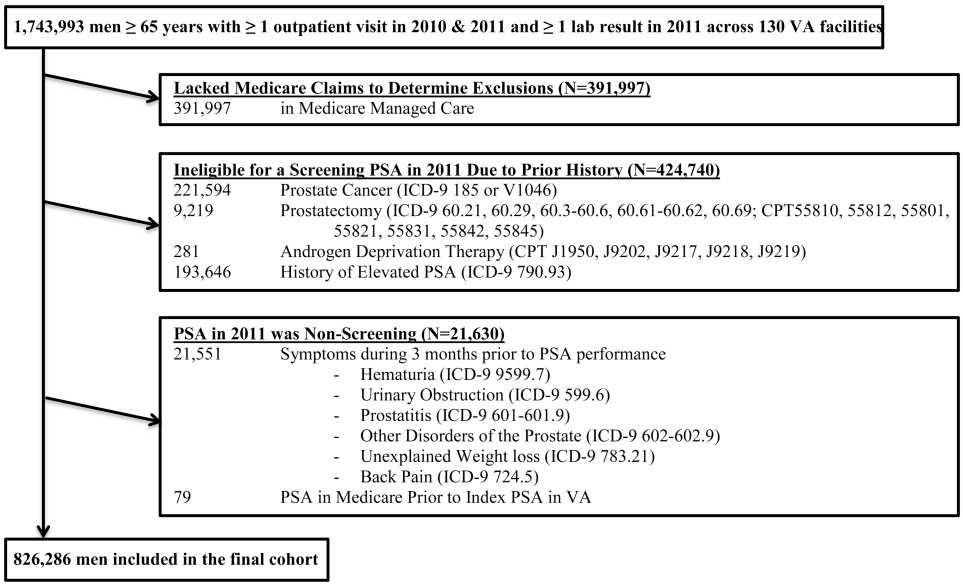

Figure 1. Exclusions used to define the final cohort of elderly men eligible for PSA screening

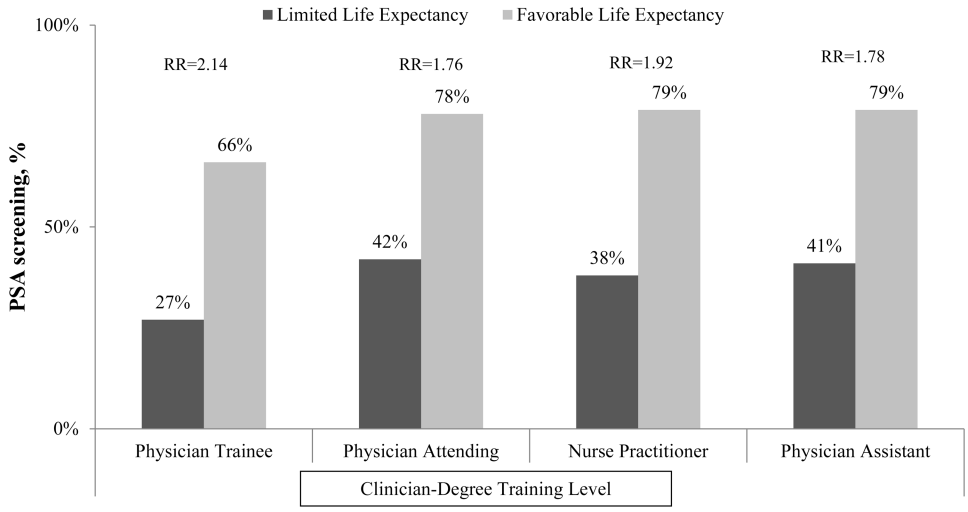

Figure 2. Percentage of Men with Screening PSA categorized by Clinician Degree and Training Level

The percentage of PSA screening among men with limited life expectancy and favorable life expectancy were significantly different in all clinician groups ($p<0.0001$). Physician trainees and nurse practitioners were slightly more likely to do differential PSA screening based on life expectancy than physician attendings or physician assistants ($P<0.001$ for interaction). However, our large sample size is detecting rather modest differences in the magnitude of the effect across groups. The association between clinician groups and differential PSA screening based on life expectancy is robust across all groups.

Table 1
Baseline Characteristics of Men 65 Years of Age or Older

Characteristics	Total Cohort (N=826,286) N (%)	Men with Limited Life Expectancy (N=203,717) N (%)	Men with Favorable Life Expectancy (N=156,671) N (%)
Ordering Clinician Characteristics			
Degree-Training[a]			
Physician Trainee	74,844 (9.3)	20,913 (10.6)	12,561 (8.2)
Physician Attending	527,614 (65.4)	127,045 (64.1)	101,889 (66.4)
Nurse Practitioner	140,870 (17.4)	34,952 (17.7)	26,736 (17.4)
Physician Assistant	56,153 (7.0)	13,135 (6.6)	10,994 (7.2)
Other Clinician Degree[b]	7,116 (0.9)	2,034 (1.0)	1,182 (0.8)
Gender[a]			
Male	419,820 (51.5)	101,418 (50.6)	81,062 (52.4)
Female	394,816 (48.5)	98,946 (49.4)	73,608 (47.6)
Specialty[a]			
Geriatric Medicine	16,051 (2.0)	6,963 (3.4)	1,232 (0.8)
General Medicine	689,993 (83.8)	163,784 (80.7)	134,379 (86.0)
Other Medicine Subspecialty	29,233 (3.5)	9,232 (4.5)	4,329 (2.8)
Non-urologic Surgery	13,407 (1.6)	3,605 (1.8)	2,231 (1.4)
Urology	1,022 (0.1)	225 (0.1)	212 (0.1)
Other Specialty[c]	74,135 (9.0)	19,201 (9.5)	13,823 (8.9)
Clinician Age[a], years			
≤ 35	49,683 (7.7)	13,771 (8.7)	8,588 (7.1)
36-45	139,730 (21.7)	34,033 (21.3)	26,659 (22.1)
46-55	217,235 (33.7)	52,934 (33.2)	41,316 (34.2)
≥ 56	238,086 (36.9)	58,729 (36.8)	44,139 (36.6)
Patient Characteristics			
Age, years			
65-69	297,721 (36.0)	37,661 (18.5)	108,689 (69.4)
70–74	159,752 (19.3)	27,157 (13.3)	47,982 (30.6)
75–79	153,512 (18.6)	32,299 (15.8)	--
80–84	114,627 (13.9)	27,664 (13.6)	--
≥ 85	100,674 (12.2)	78,936 (38.8)	--
Race/Ethnicity			
White	722,536 (87.4)	179,012 (87.9)	136,184 (86.9)
Black	72,100 (8.7)	17,756 (8.7)	14,119 (9.0)
White Hispanic	6,210 (0.8)	1,920 (0.9)	622 (0.4)
Other/Unknown	25,440 (3.1)	5,029 (2.5)	5,746 (3.7)

Characteristics	Total Cohort (N=826,286) N (%)	Men with Limited Life Expectancy (N=203,717) N (%)	Men with Favorable Life Expectancy (N=156,671) N (%)
Married[a]			
No	308,119 (37.5)	76,117 (37.6)	61,417 (39.5)
Yes	513,667 (62.5)	126,546 (62.4)	94,207 (60.5)
Charlson Comorbidity Score			
0 (good health)	243,809 (29.5)	--	156,671 (100)
1–3 (average health)	432,474 (52.3)	53,714 (26.4)	--
≥ 4 (poor health)	150,003 (18.2)	150,003 (73.6)	--
Lived in ZCTA in which ≥ 25% of Adults had a College Education[a]			
No	518,603 (64.1)	125,401 (62.6)	95,874 (62.8)
Yes	291,068 (35.9)	75,060 (37.4)	56,791 (37.2)
Median Annual Income of ZCTA[a]			
Highest Tertile (≥ $53,681)	270,148 (33.4)	68,707 (34.3)	53,191 (34.9)
Middle Tertile (> $41,276-53,681)	269,158 (33.3)	66,172 (33.1)	50,516 (33.1)
Lowest Tertile (≤ $41,276)	269,462 (33.3)	65,369 (32.6)	48,760 (32.0)

[a]Missing data: degree-training: 2.4%; gender: 1.4%; specialty: 0.3%; age: 22.0%; marital status: 0.5%; education: 2.0%; income: 2.1%.

[b]Other clinician degrees include Dentist, Pharmacist, Licensed Clinical Social Worker

[c]Other specialties include Anesthesia, Psychiatry, Audiology

ZCTA: zip code tabulation areas

Table 2

PSA screening rates

Ordering Clinician Characteristics	Screening PSA, N (%)		
	Total Cohort (N=826,286)	Men with Limited Life Expectancy (N=203,717)	Men with Favorable Life Expectancy (N=156,671)
Degree-Training			
Physician Trainee	32,192 (43.0)	5,557 (26.6)	8,300 (66.1)
Physician Attending	307,821 (58.3)	52,701 (41.5)	79,310 (77.8)
Nurse Practitioner	80,049 (56.8)	13,115 (37.5)	21,188 (79.3)
Physician Assistant	33,245 (59.2)	5,424 (41.3)	8,635 (78.5)
Other Clinician Degree[a]	3,239 (45.5)	599 (29.5)	794 (67.2)
Gender			
Male	239,851 (57.1)	40,718 (40.2)	62,052 (76.6)
Female	221,372 (56.1)	37,638 (38.0)	57,229 (77.8)
Specialty			
Geriatric Medicine	5,168 (32.2)	1,522 (21.9)	792 (64.3)
General Medicine	400,295 (58.0)	66,244 (40.5)	104,851 (78.0)
Other Medicine Subspecialty	13,143 (45.0)	2,819 (30.5)	3,061 (70.7)
Non-Urologic Surgery	6,827 (50.9)	1,452 (40.3)	1,444 (64.7)
Urology	879 (86.0)	184 (81.8)	192 (90.6)
Other specialty[b]	38,568 (52.0)	6,724 (35.0)	9,913 (71.7)
Clinician Age, in years			
≤ 35	23,069 (46.4)	4,051 (29.4)	6,017 (70.1)
36-45	78,635 (56.3)	13,215 (38.8)	20,413 (76.6)
46-55	122,598 (56.4)	20,648 (39.0)	31,934 (77.3)
≥ 56	136,699 (57.4)	23,960 (40.8)	33,749 (76.5)

[a]Other clinicians include Dentist, Licensed Clinical Social Worker, Pharmacist

[b]Other specialties include Anesthesia, Psychiatry, Audiology

Table 3

PSA screening rates in men with limited life expectancy according to clinician characteristics (N=203,717)

Ordering Clinician Characteristics	Screening PSA N (%)	Unadjusted Risk Ratio (99 % CI)	Adjusted Risk Ratio (99% CI)	P-value
Degree-Training				
Physician Trainee	5,557 (26.6)	1.00 (Ref.)	1.00 (Ref.)	
Physician Attending	52,701 (41.5)	1.91 (1.80, 2.03)	1.58 (1.46, 1.71)	< 0.0001
Nurse Practitioner	13,115 (37.5)	1.79 (1.66, 1.92)	1.60 (1.45, 1.76)	< 0.0001
Physician Assistant	5,424 (41.3)	1.94 (1.76, 2.13)	1.60 (1.43, 1.80)	< 0.0001
Other Clinician Degree[a]	599 (29.5)	1.48 (1.26, 1.75)	1.31 (1.09, 1.59)	< 0.0001
Gender				
Male	40,718 (40.2)	1.00 (Ref.)	1.00 (Ref.)	
Female	37,638 (38.0)	0.99 (0.95, 1.03)	1.13 (0.99, 1.28)	0.01
Specialty				
Geriatrics Medicine	1,522 (21.9)	1.00 (Ref.)	1.00 (Ref.)	
General Medicine	66,244 (40.5)	1.75 (1.55, 1.97)	1.61 (1.41, 1.84)	< 0.0001
Other Medicine Subspecialty	2,819 (30.5)	1.30 (1.12, 1.50)	1.26 (1.07, 1.49)	0.004
Non-Urologic Surgery	1,452 (40.3)	1.62 (1.39, 1.88)	1.69 (1.41, 2.03)	< 0.0001
Urology	184 (81.8)	3.87 (2.70, 5.57)	3.16 (2.03, 4.93)	< 0.0001
Other Specialty[b]	6,724 (35.0)	1.50 (1.32, 1.71)	1.42 (1.23, 1.65)	< 0.0001
Clinician Age				
≤ 35	4,051 (29.4)	1.00 (Ref.)	1.00 (Ref.)	
36-45	13,215 (38.8)	1.51 (1.40, 1.63)	1.25 (1.10, 1.42)	< 0.0001
46-55	20,648 (39.0)	1.60 (1.49, 1.73)	1.32 (1.16, 1.49)	< 0.0001
≥ 56	23,960 (40.8)	1.64 (1.52, 1.76)	1.38 (1.22, 1.55)	< 0.0001

Risk ratios are adjusted for age, race, marital status, college education, and income situations for adults who live within patients' ZCTA (zip code tabulation area).

[a]Other clinicians include Dentist, Licensed Clinical Social Worker, Pharmacist

[b]Other specialties include Anesthesia, Psychiatry, Audiology