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

Victoria L. Tang, MD, MAS; Ying Shi, PhD; Kathy Fung, MS; Jessica Tan, BA; Roxanne Espaldon, BA; Rebecca Sudore, MD; Melisa L. Wong, MD; Louise C. Walter, MD

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

**OBJECTIVE** To identify clinician characteristics associated with PSA screening rates in older veterans stratified by life expectancy.

**DESIGN, SETTING, AND PARTICIPANTS** Cross-sectional study of 826,286 veterans 65 years or older eligible for PSA screening who had VA laboratory tests performed in 2011 in the VA health care system.

**MAIN OUTCOMES AND MEASURES** The primary outcome was the percentage of men with a screening PSA test in 2011. Limited life expectancy was defined as age of at least 85 years with Charlson comorbidity score of 1 or greater or age of at least 65 years with Charlson comorbidity score of 4 or greater. Primary predictors were clinician characteristics including degree-training level, specialty, age, and sex. We performed log-linear 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, 466,017 (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 rates in patients with limited life expectancy was associated with having a clinician who was an older man and was no longer in training. The PSA screening rates ranged from 27% for men with a physician trainee to 42% for men with an attending physician ($P < .001$); 22% for men with a geriatrician to 82% for men with a urologist as their clinician ($P < .001$); 29% for men with a clinician 35 years or younger to 41% for those with a clinician 56 years or older ($P < .001$); and 38% for men with a female clinician older than 55 years vs 43% for men with a male clinician older than 55 years ($P < .001$).

**CONCLUSIONS AND RELEVANCE** More than one-third of men with limited life expectancy received PSA screening. Men whose clinician was a physician trainee had substantially lower PSA screening rates than those with an attending physician, nurse practitioner, or physician assistant. Interventions to reduce PSA screening rates in older men with limited life expectancy should be designed and targeted to high-screening clinicians—older male, nontrainee clinicians—for greatest impact.

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Methods

Data Sources and Patients

Using the national Veteran Affairs (VA) health care system, we identified screen-eligible men 65 years or older on January 1, 2011, with at least 1 outpatient VA visit in 2010 or 2011 and at least 1 laboratory test result in 2011 at 1 of the 130 VA facilities. Men who received PSA screening between January 1, 2011, and December 31, 2011, 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 most of their VA outpatient laboratory tests in 2011. Data were collected from the VA Corporate Data Warehouse (CDW) and National Patient Care Database. 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.

We identified 1743993 men 65 years or older who met the inclusion criteria (Figure 1). We did not include men who did not receive any laboratory tests in the VA health care system in 2011 because they could not be linked to a VA clinician and data on non-VA clinicians were not available. We excluded men enrolled in a Medicare health maintenance organization in 2010 or 2011 because they lacked claims data used for exclusions. Men with a history of prostate cancer, prostatectomy, androgen deprivation therapy, and elevated PSA levels were excluded to ensure that the index PSA test in 2011 was for screening purposes. Men with symptoms suggestive of possible prostate cancer (eg, 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

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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 an abnormal PSA result 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 health care system. PSA screening was identified by the presence of a PSA test in the 2011 CDW database through the use of logical observation identifiers names and codes (15325-4, 15323-9, 19195-7, 2857-1, 35741-8, 19197-3, 53764-7). These codes are used to identify laboratory tests and are endorsed by the Department of Defense to standardize laboratory test labeling.12,13 To confirm completeness of our PSA data, we queried an independently extracted decision support system national data extracts laboratory results data set. All (100%) of the PSA tests from our cohort were present in this confirmatory second data set.

Receipt of PSA screening was assessed for the overall cohort and 2 subgroups: men with limited life expectancy and men with favorable life expectancy. Life expectancy was determined by age and Charlson Comorbidity Index, a summary measure of 19 chronic diseases selected and weighted according to their association with mortality.14 We used the Deyo adaptation of Charlson Comorbidity Index, which was calculated from VA and Medicare inpatient and outpatient claims during the 12 months prior to January 1, 2011, and is the most extensively used comorbidity index for calculating life expectancy.5,15-18 Men were categorized as having a limited life expectancy if they were 85 years or older with a Charlson score of 1 or more, or 65 years or older with a Charlson score of 4 or more. Men were categorized as having a favorable life expectancy if they were 65 to 74 years old with a Charlson score of 0. These cutoffs were chosen to assess how extremes in health influence screening, and have been used in previous studies.5,14,17,18 These categories identify 1 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.5,18

Predictor Variables

Our main predictor variables focused on characteristics of ordering clinicians. Clinician characteristics obtained from CDW Demographics included (1) degree-training level: physician trainee, attending physician, nurse practitioner (NP), physician assistant (PA), or other degree (eg, nurse, social worker, pharmacist); (2) specialty: general medicine, geriatric medicine, other medicine subspecialty, urology, nonurologic surgery, other specialty (eg, pharmacy, psychiatry); (3) age: younger than 36, 36 to 45, 46 to 55, and 56 years or older; and (4) sex: male, female. Sex was imputed for the 16% of clinicians missing sex in CDW using http://genderize.io to determine whether the name had greater than a 50% likelihood of sex association. A sensitivity analysis found similar adjusted risk ratios with and without using imputed clinician sex.

In addition to patient age and comorbidity, we measured patient demographics known to influence cancer screening (ie, race/ethnicity, marital status) using VA and Medicare data. We used the 2010 US Census Bureau data to determine the percentage of adults with a college education and the median income for adults 65 years or older in each patient’s zip code tabulation area.

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-linear Poisson regression models with fixed effects to determine associations between clinician and patient characteristics with receipt of PSA screening. We used log-linear Poisson models to estimate unadjusted and adjusted risk ratios (ARRs) and used 99% CIs 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 data, mostly from physician trainees, we performed multivariate imputation using chained equations method for all missing values to calculate ARR with 99% CIs in our multivariate analysis.20 Multiple imputations provide valid inference under the assumption that data are missing at random (MAR). Given the large number of characteristics used for predictors in the imputation model and small amount of missing data, the MAR assumption is likely to be reasonable. A sensitivity analysis found similar ARR with and without using imputed clinician age.20 Based on prior literature, we checked an interaction effect between clinician age and sex.10 All analyses were performed using SAS (version 9.2; SAS Inc) 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 [SD] age 74, [8]; 87% were white). Sixty-five percent of the men had an attending physician, and 9% had a physician trainee. Eighty-four percent of the men had a general medicine clinician, and 37% had a clinician who was 55 years or older. 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 most of their laboratory tests in 2011.

PSA Screening Rates in Overall Cohort

In 2011, 56% of men 65 years or older received PSA screening in the VA health care system. Forty-three percent of men with a physician trainee had PSA screening compared with 58% of men with an attending physician (Table 2). Men with a geriatric medicine clinician received PSA screening at a lower rate compared with those with a general medicine clinician (32% vs 58%; P < .001). Fifty-eight percent of men with a nonurologic surgeon had PSA screening while men with a urologist had PSA screening more frequently (86%); urologists only represented 0.1% of the clinicians. Men with
Table 1. Baseline Characteristics of Men 65 Years or Older

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. (%)</th>
<th>Total Cohort (n = 826,286)</th>
<th>Men With Limited Life Expectancy (n = 203,717)</th>
<th>Men With Favorable Life Expectancy (n = 156,671)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ordering Clinician Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree/training(^b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician trainee</td>
<td>74,844 (9.3)</td>
<td>20,913 (10.6)</td>
<td>12,561 (8.2)</td>
<td></td>
</tr>
<tr>
<td>Attending physician</td>
<td>527,614 (65.4)</td>
<td>127,045 (64.1)</td>
<td>101,889 (66.4)</td>
<td></td>
</tr>
<tr>
<td>Nurse practitioner</td>
<td>140,870 (17.4)</td>
<td>34,952 (17.7)</td>
<td>26,736 (17.4)</td>
<td></td>
</tr>
<tr>
<td>Physician assistant</td>
<td>56,153 (7.0)</td>
<td>13,135 (6.6)</td>
<td>10,994 (7.2)</td>
<td></td>
</tr>
<tr>
<td>Other clinician degree(^c)</td>
<td>7116 (0.9)</td>
<td>2034 (1.0)</td>
<td>1182 (0.8)</td>
<td></td>
</tr>
<tr>
<td><strong>Sex(^a)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>419,820 (51.5)</td>
<td>101,418 (50.6)</td>
<td>81,062 (52.4)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>394,816 (48.5)</td>
<td>98,946 (49.4)</td>
<td>73,608 (47.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Specialty(^b)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General medicine</td>
<td>689,993 (83.8)</td>
<td>163,784 (80.7)</td>
<td>134,379 (86.0)</td>
<td></td>
</tr>
<tr>
<td>Geriatric medicine</td>
<td>16,051 (2.0)</td>
<td>6963 (3.4)</td>
<td>1232 (0.8)</td>
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</tr>
<tr>
<td>Other medicine subspecialty</td>
<td>29,233 (3.5)</td>
<td>9232 (4.5)</td>
<td>4329 (2.8)</td>
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</tr>
<tr>
<td>Nonurologic surgery</td>
<td>13,407 (1.6)</td>
<td>3605 (1.8)</td>
<td>2231 (1.4)</td>
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<tr>
<td>Urology</td>
<td>1022 (0.1)</td>
<td>225 (0.1)</td>
<td>212 (0.1)</td>
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</tr>
<tr>
<td>Other specialty(^d)</td>
<td>74,135 (9.0)</td>
<td>19,201 (9.5)</td>
<td>13,823 (8.9)</td>
<td></td>
</tr>
<tr>
<td><strong>Clinician age, y(^a)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤35</td>
<td>49,683 (7.7)</td>
<td>13,771 (8.7)</td>
<td>8588 (7.1)</td>
<td></td>
</tr>
<tr>
<td>36-45</td>
<td>139,730 (21.7)</td>
<td>34,033 (21.3)</td>
<td>26,659 (22.1)</td>
<td></td>
</tr>
<tr>
<td>46-55</td>
<td>217,235 (33.7)</td>
<td>52,934 (33.2)</td>
<td>41,316 (34.2)</td>
<td></td>
</tr>
<tr>
<td>≥56</td>
<td>238,086 (36.9)</td>
<td>58,729 (36.8)</td>
<td>44,139 (36.6)</td>
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</tr>
<tr>
<td><strong>Patient Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65-69</td>
<td>297,721 (36.0)</td>
<td>37,661 (18.5)</td>
<td>108,689 (69.4)</td>
<td></td>
</tr>
<tr>
<td>70-74</td>
<td>159,752 (19.3)</td>
<td>27,157 (13.3)</td>
<td>47,982 (30.6)</td>
<td></td>
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<tr>
<td>75-79</td>
<td>153,512 (18.6)</td>
<td>32,299 (15.8)</td>
<td>NA</td>
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</tr>
<tr>
<td>80-84</td>
<td>114,627 (13.9)</td>
<td>27,664 (13.6)</td>
<td>NA</td>
<td></td>
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<tr>
<td>≥85</td>
<td>100,674 (12.2)</td>
<td>27,936 (38.8)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>722,536 (87.4)</td>
<td>179,012 (87.9)</td>
<td>136,184 (86.9)</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>72,100 (8.7)</td>
<td>17,756 (8.7)</td>
<td>14,119 (9.0)</td>
<td></td>
</tr>
<tr>
<td>White Hispanic</td>
<td>6210 (0.8)</td>
<td>1920 (0.9)</td>
<td>622 (0.4)</td>
<td></td>
</tr>
<tr>
<td>Other/unknown</td>
<td>25,440 (3.1)</td>
<td>5029 (2.5)</td>
<td>5746 (3.7)</td>
<td></td>
</tr>
<tr>
<td>Married(^c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>308,119 (37.5)</td>
<td>76,117 (37.6)</td>
<td>61,417 (39.5)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>513,667 (62.5)</td>
<td>126,546 (62.4)</td>
<td>94,207 (60.5)</td>
<td></td>
</tr>
<tr>
<td>Charlson Comorbidity score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 (Good health)</td>
<td>243,809 (29.5)</td>
<td>NA</td>
<td>156,671 (100)</td>
<td></td>
</tr>
<tr>
<td>1-3 (Average health)</td>
<td>432,474 (52.3)</td>
<td>53,714 (26.4)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>≥4 (Poor health)</td>
<td>150,003 (18.2)</td>
<td>150,003 (73.6)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Lived in ZCTA in which ≥25% of adults had a college education(^b)</td>
<td>518,603 (64.1)</td>
<td>125,401 (62.6)</td>
<td>95,874 (62.8)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>291,068 (35.9)</td>
<td>75,060 (37.4)</td>
<td>56,791 (37.2)</td>
<td></td>
</tr>
<tr>
<td>Median Annual Income of ZCTA(^b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertile, $</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest (≥53,681)</td>
<td>270,148 (33.4)</td>
<td>68,707 (34.3)</td>
<td>53,191 (34.9)</td>
<td></td>
</tr>
<tr>
<td>Middle (&lt;41,276-53,681)</td>
<td>269,158 (33.3)</td>
<td>66,172 (33.1)</td>
<td>50,516 (33.1)</td>
<td></td>
</tr>
<tr>
<td>Lowest (&lt;41,276)</td>
<td>269,462 (33.3)</td>
<td>65,369 (32.6)</td>
<td>48,760 (32.0)</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: NA, not applicable; PSA, prostate-specific antigen; VA, veterans affairs; ZCTA, zip code tabulation area.

\(^a\) This table presents the characteristics for the total cohort of men 65 years or older seen at the VA in 2011 and 2 subgroups of this cohort: “Men with Limited Life Expectancy” for whom all guidelines recommend against PSA screening and “Men with Favorable Life Expectancy” for whom some guidelines recommend PSA screening based on individualized decision making. Differences between limited and favorable life expectancy subgroups were significant (P < .001) for all characteristics except for “Lived in ZCTA in which ≥25% of Adults had a College Education” (P = .14).

\(^b\) Missing data: degree-training, 2.4%; sex, 1.4%; specialty, 0.3%; age, 22.0%; marital status, 0.5%; education, 2.0%; income, 2.7%.

\(^c\) Other clinician types include dentist, pharmacist, licensed clinical social worker.

\(^d\) Other specialties include pharmacy, nursing service, and mental health. A medical chart review of 100 randomly selected men with a screening PSA test ordered by a clinician of “other specialty” at the San Francisco VA Medical Center found 94% of the PSA tests ordered by “other specialty” were performed without any reason documented or documentation indicated it was for health care maintenance. The other 6% of PSA tests were ordered to follow-up elevated PSA levels (<10.0 ng/mL) in men who had not been coded in claims data as having a prior elevated PSA level.
a younger clinician had less PSA screening than men with an older clinician (46% clinicians ≤35 years vs 57% clinicians ≥56 years; *P* < .001).

### 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* < .001). This difference was true across all clinician characteristics (Figure 2). Regardless of life expectancy, men with physician trainees had the lowest rates of PSA screening whereas men with attending physicians had the highest PSA screening rates.

Among men with a limited life expectancy, even after adjusting for all patient and clinician characteristics in Table 1, men with an attending physician had higher PSA screening rates than men with a physician trainee (ARR, 1.63; 99% CI, 1.52-1.76) (Table 3). Also, those with an NP or PA were more likely to receive PSA screening than those with a physician trainee (Table 2). Among men with limited life expectancy, screening rates were higher if their clinician specialized in urology (ARR, 2.00; 99% CI, 1.42-2.81) and was lower if their clinician specialized in geriatric medicine (ARR, 0.77; 99% CI, 0.70-0.84) compared with those specializing in general medicine. In addition, an age-sex interaction effect existed: PSA screening was higher in patients with older male clinicians vs older female clinicians (eFigure in the Supplement).

Many of the same clinician characteristics associated with PSA screening rates among men with limited life expectancy also predicted higher PSA screening among men with favorable life expectancy. Exceptions include lower percentages of men with favorable life expectancy screened by a clinician specialized in surgery vs general medicine (65% vs 78%; *P* < .001) and similar percentages of men with favorable life expectancy screened by a clinician with “other degree” vs being a physician trainee (67% vs 66%; *P* = .42).

### Discussion

Prostate-specific antigen screening remains common in the VA health care system across numerous clinician characteristics and across the spectrum of patient life expectancy. More than one-third of men with limited life expectancy, defined by criteria suggestive of less than a 5-year 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, screening rates were particularly low among men with an attending physician vs a physician trainee.

<table>
<thead>
<tr>
<th>Ordering Clinician Characteristics</th>
<th>Screening PSA, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cohort (n = 826 286)</td>
<td>Men With Limited Life Expectancy (n = 203 717)</td>
</tr>
<tr>
<td>Degree/training</td>
<td></td>
</tr>
<tr>
<td>Physician trainee</td>
<td>32 192 (43.0)</td>
</tr>
<tr>
<td>Attending physician</td>
<td>307 821 (58.3)</td>
</tr>
<tr>
<td>Nurse practitioner</td>
<td>80 049 (56.8)</td>
</tr>
<tr>
<td>Physician assistant</td>
<td>33 245 (59.2)</td>
</tr>
<tr>
<td>Other clinician degreeb</td>
<td>3239 (45.5)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>239 851 (57.1)</td>
</tr>
<tr>
<td>Female</td>
<td>221 372 (56.1)</td>
</tr>
<tr>
<td>Specialty</td>
<td></td>
</tr>
<tr>
<td>General medicine</td>
<td>400 295 (58.0)</td>
</tr>
<tr>
<td>Geriatric medicine</td>
<td>5168 (32.2)</td>
</tr>
<tr>
<td>Other medicine subspecialty</td>
<td>13 143 (45.0)</td>
</tr>
<tr>
<td>Nonurologic surgery</td>
<td>6827 (50.9)</td>
</tr>
<tr>
<td>Urology</td>
<td>879 (86.0)</td>
</tr>
<tr>
<td>Other specialtyc</td>
<td>38 568 (52.0)</td>
</tr>
<tr>
<td>Clinician age, y</td>
<td></td>
</tr>
<tr>
<td>≤35</td>
<td>23 069 (46.4)</td>
</tr>
<tr>
<td>36-45</td>
<td>78 635 (56.3)</td>
</tr>
<tr>
<td>46-55</td>
<td>122 598 (56.4)</td>
</tr>
<tr>
<td>≥56</td>
<td>136 699 (57.4)</td>
</tr>
</tbody>
</table>

Abbreviations: PSA, prostate-specific antigen; VA, veterans affairs.

* This table presents the characteristics for the total cohort of men 65 years or older seen at the VA in 2011 and 2 subgroups of this cohort: “men with limited life expectancy” for whom all guidelines recommend against PSA screening and “men with favorable life expectancy” for whom some guidelines recommend PSA screening based on individualized decision making.

b Other clinicians include dentist, licensed clinical social worker, pharmacist.

* Other specialties include pharmacy, nursing service, and mental health.

A medical chart review of 100 randomly selected men with a screening PSA test ordered by a clinician of “other specialty” at the San Francisco VA Medical Center found 94% of the PSA tests ordered by “other specialty” were performed without any reason documented or documentation indicated it was for health care maintenance. The other 6% of PSA tests were ordered to follow up elevated PSA levels (<10.0 ng/mL) in men who had not been coded in claims data as having a prior elevated PSA level.
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 nontrainee and an older male clinician. Among men with favorable life expectancy, being a nontrainee and older clinician also predicted higher use of PSA screening. Physician trainees had the lowest use rates of PSA screening among men with limited life expectancy and men 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 70 years or older received screening. The decrease in PSA screening rates over time, from 56% in 2003 to 46% in 2011 among veterans 70 years or older, 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 rates among men with limited life expectancy. Similar to findings in the 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 or older, from 44% to 37%, respectively. 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 years or older as a test that should generally not be performed. Overall, the VA and non-VA health care sectors have taken initiatives to decrease rates of 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 increased harm seen in this population.

Table 3. PSA Screening Rates in 203,717 Men With Limited Life Expectancy According to Clinician Characteristics

<table>
<thead>
<tr>
<th>Ordering Clinician Characteristics</th>
<th>Screening PSA test, No. (%)</th>
<th>Risk Ratio (99% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree/Training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician trainee</td>
<td>5557 (26.6)</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
</tr>
<tr>
<td>Attending physician</td>
<td>52,701 (41.5)</td>
<td>1.91 (1.80-2.03)</td>
<td>1.63 (1.52-1.76) &lt;.001</td>
</tr>
<tr>
<td>Nurse practitioner</td>
<td>13,115 (37.5)</td>
<td>1.79 (1.66-1.92)</td>
<td>1.65 (1.52-1.80) &lt;.001</td>
</tr>
<tr>
<td>Physician assistant</td>
<td>5424 (41.3)</td>
<td>1.94 (1.76-2.13)</td>
<td>1.68 (1.52-1.86) &lt;.001</td>
</tr>
<tr>
<td>Other clinician degreea</td>
<td>599 (29.5)</td>
<td>1.48 (1.26-1.75)</td>
<td>1.37 (1.16-1.62) &lt;.001</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>40,718 (40.2)</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
</tr>
<tr>
<td>Female</td>
<td>37,638 (38.0)</td>
<td>0.99 (0.95-1.03)</td>
<td>1.05 (0.94-1.17) .22</td>
</tr>
<tr>
<td>Specialty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General medicine</td>
<td>66,244 (40.5)</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
</tr>
<tr>
<td>Geriatrics medicine</td>
<td>1522 (21.9)</td>
<td>0.57 (0.51-0.64)</td>
<td>0.66 (0.58-0.74) &lt;.001</td>
</tr>
<tr>
<td>Other medicine subspecialty</td>
<td>2819 (30.5)</td>
<td>0.74 (0.68-0.81)</td>
<td>0.77 (0.70-0.84) &lt;.001</td>
</tr>
<tr>
<td>Nonurologic surgery</td>
<td>1452 (40.3)</td>
<td>0.93 (0.84-1.02)</td>
<td>1.01 (0.91-1.12) .86</td>
</tr>
<tr>
<td>Urology</td>
<td>184 (81.8)</td>
<td>2.21 (1.57-3.12)</td>
<td>2.00 (1.42-2.81) &lt;.001</td>
</tr>
<tr>
<td>Other specialtyb</td>
<td>6724 (35.0)</td>
<td>0.86 (0.81-0.92)</td>
<td>0.86 (0.81-0.92) &lt;.001</td>
</tr>
<tr>
<td>Clinician age, y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤35</td>
<td>4051 (29.4)</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
</tr>
<tr>
<td>36-45</td>
<td>13,215 (38.8)</td>
<td>1.51 (1.40-1.63)</td>
<td>1.17 (1.04-1.32) .001</td>
</tr>
<tr>
<td>46-55</td>
<td>20,648 (39.0)</td>
<td>1.60 (1.49-1.73)</td>
<td>1.22 (1.09-1.36) &lt;.001</td>
</tr>
<tr>
<td>≥56</td>
<td>23,960 (40.8)</td>
<td>1.64 (1.52-1.76)</td>
<td>1.28 (1.16-1.41) &lt;.001</td>
</tr>
</tbody>
</table>

Abbreviations: PSA, prostate-specific antigen; VA, veterans affairs; ZCTA, zip code tabulation areas.

a Other clinicians include dentist, licensed clinical social worker, pharmacist.
b Other specialties include pharmacy, nursing service, and mental health. A chart review of 100 randomly selected men with a screening PSA test ordered by a clinician of “other specialty” at the San Francisco VA Medical Center found 94% of the PSA tests ordered by “other specialty” were performed without any reason documented or documentation indicated it was for health care maintenance. The other 6% of PSA tests were ordered to follow up elevated PSA levels (<10.0 ng/mL) in men who had not been coded in claims data as having a prior elevated PSA level. Risk ratios are adjusted for age, race, marital status, college education, and income situations for adults who live within patients’ ZCTA.
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 sex. 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 and show conflicting results about the association between a clinician’s training level and use of 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 (eg, attending physicians, NPs, PAs). A study of New England Regional VA centers in 2007 found no significant difference between the screening rates of physician trainees compared with attending physicians, whereas a Taiwanese study in 2008 found physician trainees ordered PSA screening more often than attending physicians. The difference in these findings may be attributable to differing cultures and time periods with regard to training and PSA screening practices.

More recently trained physician trainees are likely guided by the newer 2008 and 2012 USPSTF guidelines, which have been progressively less favorable toward PSA screening, than attending physicians who trained under different guidelines. Because of this, physician trainees do not believe PSA screening tests are advantageous in contrast with attending physicians and are less likely to order PSA screening tests. Also, attending clinicians have likely seen more men diagnosed as having prostate cancer, and trust their clinical experience with prostate cancer screening and diagnosis over current screening guidelines.

To our knowledge, our study is also the first to compare PSA screening among patients with geriatricians vs 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 and general medicine. 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. Also, characteristics of urologists and other clinicians who did not order PSA tests in 2011 were not captured unless they were linked to men as the clinician who ordered most of their VA laboratory tests.

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. Also, several studies have demonstrated the inverse relationship between the number of years that a physician has been in practice and his or her adherence to standards of practice in the use of screening tests and preventive health care. 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 clinicians who are women differing by age. The clinician age-sex 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 nonveterans. The veteran population may have worse health than the general population, and younger veterans aged 55 to 69 years have reported higher rates of screening than nonveterans. However, the VA health care system is the largest health care system for older men in the United States and is important to study in its own right. Also, data from 2011 may not reflect current screening practices after the new 2012 USPSTF guidelines 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 75 years or older. While there is heterogeneity among state screening rates and a decrease in screening in younger men, approximately 1.4 million men 65 years or older with a life expectancy of less than 9 years were screened in 2013 despite 2012 USPSTF guidelines. Finally, despite our exclusion criteria, some men in our final cohort may have received PSA testing for nonscreening 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 nonscreening tests, even though no prostate problem or symptom was coded in VA or Medicare claims data. Exclusion of these tests did not affect our findings.

Conclusions

Prostate-specific antigen screening in men with limited life expectancy is still common and is associated with several clinician characteristics. Reducing PSA screening in men with limited life expectancy requires removing “best practice alerts” that encourage PSA screening, regardless of life expectancy. Also, educational interventions discouraging screening in men with limited life expectancy designed and targeted to the highest users of PSA screening—older male, nontrainee clinicians—will likely have the greatest impact in reducing PSA screening in older men with limited life expectancy.
Clinician Factors Associated With Prostate-Specific Antigen Screening in Older Veterans

ORIGINAL INVESTIGATION RESEARCH


Conflict of Interest Disclosures: None reported.

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REFERENCES
