

Prostate Biopsy Characteristics: A Comparison Between Pre- and Post-United States Preventive Service Task Force Prostate Cancer Screening Guidelines of 2012

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This article compares prostate cancer (PCa) characteristics diagnosed by prostate biopsy in the years before and after the 2012 United States Preventative Service Task Force (USPSTF) recommendations against PCa screening. We completed a retrospective comparative analysis of 402 sequential PCa biopsy-diagnosed patients in 2010 to 2012 (3 years) with 269 PCa patients diagnosed in 2015 to 2016 (18 months). Data were collected on patient age, total number of biopsies performed, prostate-specific antigen level, Gleason sum score, and digital rectal examination results. The data were analyzed to determine whether the 2012 USPSTF screening recommendations affected PCa characteristics.

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KEY WORDS

Prostate cancer • Screening

In 2015 the American Cancer Society reported 220,000 new cases of prostate cancer (PCa) and 30,000 deaths due to PCa in the United States. PCa

is the second leading cause of cancer-related deaths in the United States among men. The incidence of PCa is the highest in men aged 65 and older (66%)¹;

20 years of prostate-specific antigen (PSA) and digital rectal examination (DRE)-based PCa screening has reduced PCa mortality by 50%.² There are 3 million PCa survivors in the United States.

In 2008, the United States Preventive Service Task Force (USPSTF) recommended against screening men aged 75 and older; in 2012, the USPSTF recommended against PCa screening for all age groups.^{3,4} In 2013, the American Urological Association (AUA) recommended against screening men 70 years and older.⁵ Survey data indicate that subsequent to 2013, 50% of primary care doctors do not offer PCa screening.⁶ In 2013, PCa screening decreased by 18%.⁷ Unfortunately, the diagnosis of metastatic cancer increased by 72% from 2004 to 2013.⁸ In 2015, 1400 additional cases of PCa-specific mortality were documented.⁹ It is estimated that, if PCa screening is discontinued, 6000 additional deaths due to PCa will occur annually in the United States.¹⁰

As the life expectancy range for men aged 70 to 80 years is 14.1 to 8.1 years, an increasing number of men in this age group will be at risk for high-grade PCa.¹¹ A recent 10-year study of 230,081 US veterans found that 10.5% died from PCa, and 77.4% of the PCa deaths occurred in men between the ages of 70 and 89 years.¹² In this study, we sought to determine whether PCa diagnoses and cancer characteristics have changed in our clinical practice after the publication of the USPSTF and AUA recommendations.

Methods and Materials

In 2014, we published a retrospective analysis of 402 PCa patients diagnosed by prostate biopsy (Pbx) in which pretreatment characteristics were stratified

by age.¹³ The study examined PCa patients from 2010 to 2013 (3 years, Group A). To study the effects of decreased PCa screening, we analyzed an additional 269 PCa cases diagnosed by Pbx from 2015 to 2016 (18 months, Group B) and compared it with our previous study of 402 PCa cases. Data were collected on patient age, number of biopsies, PSA level, Gleason sum score (GSS), and DRE results.

We collected all case data from our community-based clinical practice of a group of 12 board certified urologists located in Greenbelt, Maryland. The majority

comprised patients diagnosed after the USPSTF screening recommendations (2015-2016).

Our GSS were divided into two groups, GSS 6 and GSS 7 to 10. This grouping was chosen in order to differentiate those with less aggressive pathology (GSS 6) and those containing a component of Gleason score 4, which is clinically associated with aggressive PCa (GSS 7-10). A recent study of 1691 patients with localized PCa who underwent radical prostatectomy found that a Gleason score 4 component was a significant predictor of adverse pathology.¹⁴

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of patients had a transrectal ultrasound-guided 12-core Pbx under intravenous sedation, whereas a few patients had a 12-core Pbx under local anesthesia, on an outpatient basis. Their primary care physicians cleared all patients for these procedures. All biopsies in both study groups were performed for the indications of a PSA level over 2.5 ng/mL, an abnormal DRE result, or both. The patient population and the group practice urologists were the same for both study groups.

Patient age groups were stratified as follows: under 55 years, 56 to 69 years, and 70 to 80 years. The charts of consecutive patients from our practice were reviewed and the information was entered in a database. The data were analyzed to determine whether the new USPSTF screening recommendations affected PCa characteristics. Two study groups were defined; Group A consisted of patients diagnosed prior to the USPSTF screening recommendations (2010-2012), and Group B

χ^2 or Fisher exact tests were used to compare frequencies. All analyses were conducted using the SAS (Cary, NC) software program. The study was approved by the Western Institutional Review Board (Philadelphia, PA; study #1087891).

Results

Prostate Biopsy

In the Pre-USPSTF period (Group A), 1703 total biopsies were performed over 3 years. The Pbx rate was 567 biopsies/year. There were 402 positive Pbx results over 3 years. The positive biopsy result rate was 134 results/year. In the post-USPSTF guidelines period (Group B), there were 603 total Pbx, an annual rate of 402 biopsies/year. There were 269 positive Pbx results, an annual rate of 179 positive results/year. This showed a 30% reduction in the number of biopsies and also a 33.5% increase in the positive results in Group B as compared with Group A (Table 1).

TABLE 1
Biopsy Statistics in Group A Versus Group B

| | Group A (3-y period) | Group B (18-mo period) | Note |
|-----------------------------|----------------------|------------------------|----------------|
| Total biopsies | 1703 | 603 | |
| Annual biopsy rate | 567 biopsies/y | 402 biopsies/y | 30% reduction |
| Total positive biopsies | 402 | 269 | |
| Annual positive biopsy rate | 134/y | 179/y | 33.5% increase |

Age

The age groups were stratified as follows: 55 years, 55 to 69 years, and 70 to 80 years. A comparison was made with Group A of 402 PCa patients and Group B of 269 PCa patients. In Group A, 8.9% were under age 55, 56.2% were aged 55 to 69 years, and 34.8% were aged 70 to 80 years. In Group B, 16% were under age 55, 66.5%

were aged 55 to 69 years, and 17.5% were aged 70 to 80 years. In Group B, both the under age 55 and the 70- to 80-year age groups were 50% reduced compared with Group A.

Prostate-specific Antigen

The PSA level in Group A was under 4 ng/mL in 11.1%, 4 to 9.9 ng/mL in 63.4%, and ≥ 10 ng/mL

in 25.4%. In Group B, the PSA was under 4 ng/mL in 6.7%, 4 to 9.9 ng/mL in 68.4%, and ≥ 10 ng/mL in 25.2%. In Group B, the group with PSA under 4 ng/mL was 37.6% compared with 62.4% in Group A. No statistically significant difference in PSA level for these subgroups was found in Group B versus Group A for any age group ($P = .0929$; Table 2).

TABLE 2
Comparison of PSA Levels by Age in Group A Versus Group B

| Age (y) | n | Group A | | | P Value ^a |
|---------|-----|-------------------|----------------------|-------------------|----------------------|
| | | PSA < 4 ng/mL (%) | PSA 4-9.99 ng/mL (%) | PSA ≥ 10 (%) | |
| < 55 | 36 | 5 (13.9) | 25 (66.7) | 6 (19.4) | |
| 56-69 | 226 | 23 (10.2) | 150 (64.6) | 53 (25.2) | |
| 70-80 | 140 | 17 (12.1) | 80 (56.4) | 43 (31.4) | |
| | 402 | 45 (11.1) | 255 (63.4) | 102 (25.4) | |
| Age (y) | n | Group B | | | P Value ^a |
| | | PSA < 4 ng/mL (%) | PSA 4-9.99 ng/mL (%) | PSA ≥ 10 (%) | |
| < 55 | 43 | 5 (12) | 27 (63) | 11 (25.6) | .6267 |
| 56-69 | 179 | 9 (5) | 129 (72) | 41 (22.9) | .1470 |
| 70-80 | 47 | 3 (6) | 28 (60) | 16 (34) | .5350 |
| | 269 | 17 (6.7) | 184 (68.4) | 68 (25.2) | .0929 |

PSA, prostate-specific antigen.

^a $P = .0929$ (no statistically significant difference in PSA for < 4 ng/mL, 4-10 ng/mL, or ≥ 10 ng/mL in Group A versus Group B for any age group).

TABLE 3**Comparison of GSS by Age in Group A Versus Group B**

| | | Group A | | |
|---------|-----|------------|--------------|----------------------|
| Age (y) | n | GSS 6 (%) | GSS 7-10 (%) | |
| < 55 | 36 | 18 (50) | 18 (50) | |
| 56-69 | 226 | 122 (54) | 104 (46) | |
| 70-80 | 140 | 55 (39.3) | 85 (60.7) | |
| | 402 | 195 (48.5) | 207 (51.5) | |
| | | Group B | | |
| Age (y) | n | GSS 6 (%) | GSS 7-10 (%) | P Value ^a |
| < 55 | 43 | 28 (65) | 15 (35) | .1749 |
| 56-69 | 179 | 74 (41) | 105 (59) | .0115 |
| 70-80 | 47 | 21 (45) | 26 (55) | .5147 |
| | 269 | 123 (45.7) | 146 (54.3) | .4793 |

GSS, Gleason sum score.

^a*P* = .4793 (no statistically significant difference in GSS 6 and 7-10 in Group A versus Group B in total; statistically significant higher GSS 7-10 in the 56- to 69-year age group for Group B versus Group A).

Gleason Sum Score

In Group A, a GSS of 6 was found in 195 patients (48.5%), and in 123 patients in Group B (45.7%). In Group A, a GSS of 7 to 10 was found in 207 patients (51.5%), and in 146 patients in Group B (54.3%).

GSS of 7 to 10 was higher in Group B by 5.4% as compared with Group A. There was no statistically significant difference in GSS 6 and 7 to 10 in Group A versus Group B in total (*P* = .4793). Subgroup analysis did show a statistically significant higher GSS 7 to 10 in the 56- to 69-year-old for Group B versus Group A (*P* = .0115; Table 3).

Digital Rectal Examination

In Group A, a normal DRE result was found in 151 patients and an abnormal DRE result was found in 251 patients. In Group B, a normal DRE result was found in 213 patients

and an abnormal DRE result was found in 56 patients (Table 4).

Normal Digital Rectal Examination and Gleason Sum Score

In Group A, 78 patients (52%) with a normal DRE result had a GSS of 6 and 73 (48%) had a GSS of 7 to 10. In Group B, 104 patients (49%) with a normal DRE result had a GSS of 6 and 109 (51%) had a GSS of 7 to 10.

Abnormal Digital Rectal Examination and Gleason Sum Score

In Group A, a GSS of 6 was seen in 113 patients (45%) and a GSS of 7 to 10 was seen in 138 patients (55%). In Group B, a GSS of 6 was seen in 18 patients (32%) and a GSS of 7 to 10 was seen in 38 patients (68%). In patients with abnormal DRE results, a GSS of 7 to 10 was present in 68% in Group B, compared

with 55% in Group A. A subgroup analysis of prostate cancer patients 56 to 69 years old showed a statistically significant increase in patients with GSS 7 to 10 in group B (78%) versus group A (50.6%; *P* = .0044).

Discussion

The current study reviewed our community-based urologic practice and found that the Pbx rate decreased by 30% in the post-USPSTF guidelines period. Additionally the PCa detection rate was 33.5% higher in the post-USPSTF guidelines period. We also found a 5.4% higher rate of high-grade tumors (GSS 7-10) in the post-USPSTF guidelines period.

The Prostate, Lung, Colorectal and Ovarian (PLCO) Cancer Screening Trial on which the USPSTF based their 2012 recommendation against PCa screening was found to be 90% contaminated

TABLE 4**Comparison of GSS by DRE and Age in Group A Versus Group B**

| | | Group A | | |
|---------|-----|----------------------------|--------------|----------------------|
| | | Abnormal DRE Result by Age | | |
| Age (y) | n | GSS 6 (%) | GSS 7-10 (%) | |
| < 55 | 27 | 18 (66.7) | 9 (33.3) | |
| 56-69 | 139 | 69 (49.4) | 70 (50.6) | |
| 70-80 | 85 | 26 (30.9) | 59 (69.1) | |
| | 251 | 113 (45) | 138 (55) | |
| | | Normal DRE Result by Age | | |
| Age | n | GSS 6 (%) | GSS 7-10 (%) | |
| < 55 | 9 | 4 (44.4) | 5 (55.6) | |
| 56-69 | 87 | 49 (56.8) | 38 (43.2) | |
| 70-80 | 55 | 25 (44.7) | 30 (55.3) | |
| | 151 | 78 (52) | 73 (48) | |
| | | Group B | | |
| | | Abnormal DRE Result by Age | | |
| Age (y) | n | GSS 6 (%) | GSS 7-10 (%) | P Value ^a |
| < 55 | 8 | 5 (63) | 3 (37) | .8274 |
| 56-69 | 32 | 7 (22) | 25 (78) | .0044 |
| 70-80 | 15 | 6 (38) | 10 (62) | .5856 |
| | 56 | 18 (32) | 38 (68) | |
| | | Normal DRE Result by Age | | |
| Age | n | GSS 6 (%) | GSS 7-10 (%) | P Value |
| < 55 | 35 | 23 (66) | 12 (34) | .2425 |
| 56-69 | 147 | 66 (45) | 81 (55) | .0912 |
| 70-80 | 31 | 15 (48) | 16 (52) | .7935 |

DRE, digital rectal examination; GSS, Gleason sum score.

^aStatistically significant difference in GSS 7-10 in Group B versus Group A in the 56- to 69-year age group with an abnormal DRE result.

and hence should not form the basis of national guidelines.¹⁵ Moreover, the recently published Prostate Testing for Cancer and Treatment (ProtecT) study showed that active monitoring (surveillance) is associated with a 50% increased risk of developing metastatic disease at 10 years of follow-up.¹⁶

Following the USPSTF recommendations, there was a 64% decrease in DRE screening and a 39% decrease in PSA screening.¹⁷

Additionally, Pbx for cancer have decreased by 21.4% following the USPSTF recommendations.¹⁸

Since 2013, more advanced PCa, metastatic PCa, and PCa-

to 2013. Those in the 55- to 69-year age group showed the highest rate of increase (92% increase from 2004 to 2013).⁸ The 5-year survival rate in metastatic PCa is

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specific deaths have been documented. A recent study showed that the incidence of metastatic PCa increased by 72% from 2004

28%,¹⁹ and the cost of treating metastatic PCa is extremely high. More importantly, patients with metastatic PCa have more pain

and a much lower quality of life. The annual cost of the screening PSA test for PCa is \$28.

We noted that 61% and 55% of men 70 to 80 years old had GSS scores of 7 to 10 in our pre- and post-2012 studies, respectively. In our prior study of 5100 men 70 to 80 years old diagnosed with average-risk PCa (84% with PSA < 10 ng/mL) who were treated by radiation (external, brachytherapy, or both), 61% had a GSS of 7 to 10.²⁵ As surgical series have found that 40% to 50% of men with a GSS of 6 are upgraded to a GSS of 7 to 10 at the time of prostatectomy, it is likely that 80% of our patients 70 to 80 years old had a GSS of 7 to 10.^{20,21} Unfortunately, in 2013, the AUA recommended against PCa screening in men 70 years and older, despite many published studies that documented that men 70 years and over have more prevalence of PCa, more locally advanced PCa, more metastatic PCa, and more deaths due to PCa.²²⁻²⁴

These aforementioned reports strongly indicate that PCa screening should be made available to detect early PCa and that PCa be treated appropriately, especially for men aged 70 to 80 years. In

addition, PCa screening is more essential for African-American men, men with family history of PCa, and men who are poor and less educated, who frequently do

give clinicians guidance to counsel patients regarding active surveillance or treatment. The diagnosis is the cornerstone of medical care and treatment should be individu-

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not seek medical help until symptoms arise (probably a sign of metastatic disease).

In the current study, the detection rate for PCa was 33.5% higher in the post-USPSTF period. Recently, new, more powerful tools to facilitate cancer detection have entered clinical practice. These include imaging technology such as multiparametric prostate magnetic resonance, and novel genetic and chemical tests that allow clinicians to better focus biopsies in cancerous regions; these will help physicians determine which patients may harbor cancer despite negative initial biopsy results, and which patients are at high risk for metastatic disease. Moreover, these new diagnostic and risk stratification tools

alized. The notion that every PCa patient will be treated with surgery or radiation is obsolete.

Conclusions

This study shows that the Pbx rate decreased by 30% after the USPSTF guidelines, but the PCa detection rate increased by 33.5%. High-grade GSS 7 to 10 PCa increased by 5.4% after the USPSTF guidelines. These findings suggest that the PCa screening recommendations should be re-evaluated to significantly decrease the rising trend of PCa morbidity and mortality. We strongly believe that PSA-based PCa screening should be made available, especially to men 70 years and older. ■

MAIN POINTS

- In 2008, the United States Preventive Service Task Force (USPSTF) recommended against screening men aged 75 and older; in 2012, the USPSTF recommended against prostate cancer (PCa) screening for all age groups. In 2013, the American Urological Association recommended against screening men 70 years and older. It is estimated that, if PCa screening is discontinued, 6000 additional deaths due to PCa will occur annually in the United States.
- Following the USPSTF recommendations, there was a 64% decrease in digital rectal examination screening and a 39% decrease in prostate-specific antigen screening. The current study found that the prostate biopsy rate decreased by 30% after the USPSTF recommendations.
- Since the 2013 USPSTF recommendations, more advanced PCa, metastatic PCa, and PCa-specific deaths have been documented. The current study found that high-grade GSS 7 to 10 PCa increased by 5.4% after the USPSTF recommendations.
- The findings in the current study and other similar published reports suggest that the PCa screening recommendations should be quickly re-evaluated to significantly decrease the rising trend of PCa morbidity and mortality. We strongly believe that PSA based PCa screening should be made available, especially to men 70 years and older.

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