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The Influence of decision aids on prostate cancer screening preferences: A randomized survey study

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Abstract

Purpose: Shared decision making is recommended regarding prostate cancer screening. Decision aids may facilitate this process; however, the impact of decision aids on screening preferences is poorly understood.

Materials and Methods: In an online survey, a national sample of adults were randomized to one of six different professional societies' online decision aids. We compared pre- and post-decision aid responses. The primary outcome was change in participant likelihood to undergo or recommend prostate cancer screening on a scale of 1 (unlikely) to 100 (extremely likely). Secondary outcomes included change in participant comfort with prostate cancer screening based on the average of six, five-point Likert-scale questions.

Results: Median age was 53 years for the 1,336 participants, and 50% were men. Randomized groups did not differ significantly by race, age, gender, income, marital status, or education level. Likelihood to undergo or recommend prostate cancer screening decreased from 83 to 78 following decision aid exposure ($p < 0.001$; Figure 1a and 1b). Reviewing the decision aid from the Centers for Disease Control or American Academy of Family Physicians did not alter likelihood (both $p > 0.2$), while the decision aid from the United States Preventive Services Task Force was associated with the largest decrease in screening preference (-16.0 , $p < 0.001$). Participants reported increased comfort with the decision-making process for prostate cancer screening from 3.5 to 4.1 (out of 5, $p < 0.001$) following exposure to a decision aid.

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Conclusions: Exposure to a decision aid decreased participant likelihood to undergo or recommend prostate cancer screening and increased comfort with the screening process.

Keywords

prostatic neoplasm; early detection of cancer; decision support techniques; surveys and questionnaires; prostate-specific antigen

Introduction

The widespread adoption of prostate cancer (PCa) screening in the United States by serum prostate-specific antigen (PSA) testing has led to more men being diagnosed in a localized, curable form,¹ yet controversy exists regarding over-diagnosis and over-treatment of indolent tumors.² These concerns have influenced professional societies to recommend a shared decision-making process between a man and his care giver regarding PCa screening.^{3, 4} However, there are no guidelines on shared decision making for PCa screening, and only about 36% of men who undergo PCa screening do so following a joint decision with a caregiver.⁵

Decision aids (DAs) have been designed to provide accurate, easy-to-understand information for patients to help navigate the decision-making process.⁶ The effect of specific DAs on screening preferences and comfort with the screening decision-making process remains unknown.

The goal of the current study was to evaluate the effect of six published DAs from major professional societies on PCa screening preferences. We administered an online survey to adult men and women and compared pre- and post-DA likelihood to undergo or recommend PCa screening. We also assessed the effect of DAs on comfort with the PCa screening decision-making process and the quality of each DA.

Materials and Methods

Decision aids and survey

Six major societies have DAs designed to educate and inform subjects about the risks, benefits, and process of PCa screening (Table S1). Each DA was readily available and free online, reflecting what real patients or family members may access in clinical scenarios. The DAs were from: American Society of Clinical Oncology (ASCO), the American Cancer Society (ACS), the Centers for Disease Control (CDC), the United States Preventive Services Task Force (USPSTF), the American Academy of Family Physicians (AAFP), and the American Urological Association (AUA).

We developed pre- and post-DA surveys (Appendix 1). Pretest questions included demographic information and co-morbid conditions. We used a 100-point Likert scale, with 100 being most likely, to assess intention to undergo or recommend PCa screening before and after reading the DA. Post-test questions also assessed the effect of DA on participant comfort with the PCa screening decisionmaking process and the participants' opinions on the content and quality of DAs.

After assessing the impact of reading the single DA each participant received, we gave each participant the summary statements of all six of the professional societies (Appendix 2). We then asked the participants to again report their opinion of PCa screening.

Study participants and design

We obtained ethics approval for exemption status from the Northwestern University Institutional Review Board. Using ResearchMatch, an online national research study recruitment registry, we distributed the survey and decision aids anonymously to volunteers age 18 and older throughout the United States.⁷ We randomized participants to receive one of the six DAs based on information available from a baseline survey: age groups <50, 50–59, 60–69, >69 years; race (white, African-American, Asian or Pacific Islander, or other); and gender (male or female). We conducted randomization using REDcap (Vanderbilt University, Nashville, TN), an online survey data storage and management application.⁸ The survey was open from October 18, 2017 to November 19, 2017. A survey invitation was sent to 47,633 e-mail addresses of volunteers who met study criteria. A total of 1,981 expressed interest in participating. Of these, 1,838 (93%) participants completed the baseline survey and were randomized. Finally, 1,336 (67%) completed the entire survey and were analyzed in the final cohort.

Each pre-test and post-test survey was identical except for the pretest URL link that opened a new webpage to the DA to which each participant was randomly assigned. We asked each participant to take as much time as necessary to understand the information provided by the DA, after which they should continue to the post-test questions.

Outcomes

The primary outcome was change in likelihood to undergo or recommend PCa screening after exposure to a DA. This was assessed by asking participants “If a doctor asked you right now to make a choice about whether or not you or a loved one should get screened for PCa, what is the likelihood you will undergo PCa screening or encourage a family member to undergo PCa screening (if you are not male or in the screening age group)?” The participants then selected their likelihood on a 100-point scale, with 100 being “extremely likely.” The secondary outcome was a rephrasing of this question to assess the effect of a caregiver’s opinion that was assessed similarly to the primary outcome with the phrasing, “If a doctor recommended you or a loved one to get screened for PCa, what is the likelihood that you will undergo PCa screening or encourage a family member to undergo PCa screening (if you are not male or in the screening age group)?”

Other secondary outcomes included changes in comfort and knowledge about PCa screening, participant rating of the quality of each DA, and correlation of demographic information with intention to undergo or recommend PCa screening. Composite comfort with the screening process and quality of the DAs were based on the average of six, five-point Likert-scale questions (Questions 1–4 and 6–7 in Section 2 and Questions 5–10 in Section 4, respectively; Appendix 1). Knowledge was assessed on 11 true/false questions about PCa and screening (Questions 1–9 and 11–12 in Section; Appendix 1).

Covariates

Participant baseline characteristics assessed included age, race and ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other), gender, highest education attainment, annual income, type of health insurance, marital status, self-rating of overall health on a 100-point scale, smoking status, previous discussion with caregiver regarding PCa screening, personal or close relative history of cancer, and number of comorbidities from the following list: diabetes, chronic obstructive pulmonary disease, heart disease, high blood pressure, and body mass index ≥ 35 .

Statistical analysis

We used Mann-Whitney U and Pearson's Chi Squared tests to compare patient characteristics between DA cohorts, Student's t-tests to compare changes in pre- to post-test responses, and multivariable linear regression analyses to evaluate the association between baseline participant characteristics and pre-test perceptions of PCa screening. Multivariable linear regressions were also used to compare the effect on individual DAs on changes in PCa preferences and comfort with the screening decision making process with the DA from ASCO serving as the *a priori* reference. We considered a p-value <0.05 to be statically significant. All statistical analyses were two tailed and conducted using Stata 13.0 (College Station, TX).

Results

Participant baseline characteristics

Of the final cohort of 1,336 participants, 671 (50%) were men, 1,163 (87%) were white, and the median age was 53 years (Table S2). About half of participants had an annual income of \$65,000 or less, and 44% had a post-graduate degree. Randomized groups did not differ significantly by race, age, gender, income, marital status, or education level.

Appendix 1: Perceptions of Prostate Cancer Screening

At baseline, the likelihood to undergo or recommend PCa screening was 83 out of 100 (95% CI 82–85). If a physician recommended PCa screening, baseline likelihood was 87 (95% CI 85–89).

Multivariable linear regression showed covariates associated with lower likelihood to screen for PCa included professional degree (MD, DDS, DVM, or JD) or doctoral degree (PhD, EdD, or ScD) compared to high school or some college (Likelihood score: -8.37 , 95% CI -13.06 to -3.69 , $p<0.001$) and annual income $>\$100,000$ (-6.75 , 95% CI -11.13 to -2.38 , $p=0.003$; Table 1) compared to $\leq \$35,000$.

Covariates associated with a higher likelihood to screen for PCa included being divorced or separated (compared to single/never married; likelihood score: 6.37 , 95% CI 1.85 to 10.89 , $p=0.006$), having a close relative who died from cancer (compared to not having a closer relative with cancer; 8.91 , 95% CI 0.01 to 2.91 , $p<0.001$), and having a previous discussion with a caregiver regarding PCa screening (compared to no discussion; 5.78 , 95% CI 1.34 to 10.22 , $p=0.011$) (Table 1). These results were similar to those seen when a physician

recommended screening, except the effect of a previous PCa screening discussion was no longer significant ($p=0.157$).

After exposure to any DA, the average intention to undergo or recommend PCa screening decreased from 83.3 to 77.5 (Change -5.8 ; $p<0.001$; Figure 1 a). Reading the DAs from the CDC or AAFP did not alter likelihood to screen (both $p>0.2$), while reading the DA from the USPSTF was associated with the largest decrease (Change: -16.0 , 95% CI -12.7 to -19.3 , $p<0.001$).

When participants were asked about their likelihood to undergo PCa screening or recommend screening based on a physician's recommendation, the likelihood score decreased from 86.7 to 82.3 (Change -3.2 ; $p<0.001$; Figure 1b). Similarly, reading DAs from the CDC or AAFP did not significantly alter likelihood to screen (both $p>0.1$).

Compared to exposure to the ASCO DA, exposure to the DA from the USPSTF was associated with a greater decrease in change from baseline likelihood (Change: -12.11 , 95% CI -15.63 to -8.60 , $p<0.001$; Figure 2), while the DAs from the CDC and AAFP were associated with increases in baseline likelihood (3.67, 95% CI 0.16 to 7.18, $p=0.041$ and 4.18, 95% CI 0.68 to 7.69, $p=0.019$, respectively). Adjusting for all baseline characteristics, compared to exposure to the ASCO DA, results were similar when a physician recommended screening, except the exposure to the DAs from the CDC or AAFP were not associated with significant differences (both $p>0.1$).

Comfort with and knowledge of prostate cancer screening

Baseline mean composite score for comfort with PCa screening was 3.5 out of 5. Higher baseline comfort with PCa screening was associated with female gender (Comfort score: 0.18, 95% CI 0.03 to 0.33, $p=0.017$), being personally cured of cancer (compared to no personal history of cancer diagnosis; 0.23, 95% CI 0.10 to 0.36, $p=0.001$), and having a previous discussion with a caregiver about PCa screening (0.73, 95% CI 0.57 to 0.90, $p<0.001$). Compared to not having a close relative with a cancer history, having a relative alive with a cancer diagnosis (0.36, 95% CI 0.01 to 1.93, $p<0.001$) or deceased from cancer (0.31, 95% CI 0.01 to 2.91, $p=0.001$) were both associated with increased baseline comfort with screening. (Table S3). Race did not affect comfort.

After exposure to any DA, mean comfort score increased from 3.5 to 4.1 out of 5 ($p<0.001$, Figure 3). No specific DA was superior in increasing comfort with screening compared to others (Figure 2). Mean pre-test score on knowledge questions was 9.6 out of 11 and increased to 10.0 following DA exposure ($p<0.001$). Each individual DA was associated with a similar increase in correct knowledge based questions.

Decision aid quality

Mean composite quality score of DAs was 4.3 out of 5 and DA quality measures varied minimally (Figure S and Table S4). Quality scores ranged from 4.2 (ASCO and USPSTF) to 4.4 (CDC).

We also assessed the direction of participant perception of DA bias. Relative to the DA from ASCO, the DA from USPSTF was associated with greater bias towards not screening (Bias score: -0.42 , 95% CI -0.57 to -0.26 , $p<0.001$) while the DA from the AAFP was associated with greater bias towards screening (0.18 , 95% CI 0.03 to 0.34 , $p=0.019$; Figure 2).

Societal recommendations

Participants were then exposed to society recommendation statements (Appendix 2). Following this, average screening preferences then decreased from 77.5 to 73.7 (Change -3.8 , $p<0.001$). Screening preferences did not change significantly for participants randomized to DAs from ASCO and the ACS (all $p>0.1$). Preferences did decrease further for participants randomized to DAs from the CDC (Change -2.3 , $p=0.033$), USPSTF (Change -2.6 , $p=0.024$), AAFP (Change -10.1 , $p<0.001$), and the AUA (Change -5.7 , $p<0.001$).

Discussion

Several studies related to PCa screening suggest DAs can improve knowledge and reduce decisional regret.^{6,9} Our online survey assessed participant preferences of PCa screening before and after exposure to randomly-assigned DAs from six major professional societies. Our results suggest exposure to most DAs made participants more comfortable with the PCa screening decision-making process and decreased likelihood to undergo or recommend PCa screening. One explanation for this finding may be most people assume the benefits of any cancer screening outweigh the potential risks and DAs may help educate on both the risks and benefits of screening.

Participants with higher annual incomes and more education were less likely to elect PCa screening, suggesting patients in these cohorts already may have been more informed of potential risks associated with screening. Accordingly, free, easily assessable DAs such as those assessed in the current study may be utilized more to reduce socioeconomic disparities in knowledge of and comfort with PCa screening. A recent assessment of the effect of the ACS DA on medically underserved men showed it improved PCa knowledge.⁹ Importantly, quality scores for each DA varied minimally suggesting DAs were all favorably received.

The DA from the USPSTF was associated with the greatest perception of bias against screening by the study participants, while that of the AAFP was perceived to be as biased more in favor of screening (See links in Table S1). Notably the DA from the USPSTF includes detailed definitions of the potential harms of screening, such as over-diagnosis, over-treatment, urinary incontinence, and erectile dysfunction. This DA also includes a cartoon that explains how some PCa tumors are indolent.

In contrast, the DA from the AAFP does not mention over-diagnosis or over-treatment. It defines urinary incontinence and erectile dysfunction but minimally, which may minimize the effect of defining those adverse treatment effects. Finally, the AAFP describes “watchful waiting” in little detail and does not acknowledge some men may never need treatment. These subtle details may explain why the USPSTF DA was associated with the largest decrease in screening likelihood score while that of the AAFP was not associated with any

change. Ironically, the AAFP currently recommends against routine screening (Appendix 2), yet participants who read its DA were not less likely to screen after reading it.

Our study has limitations. Our final participation rate was moderate at 67%. This may reflect a need for participant computer and internet skills. Participants largely had at least college educations, private or Medicare insurance, and incomes >\$66,000. These data suggest the overall study results are more generalizable to a population of higher socioeconomic status. Notably, the changes in screening preferences in this study were significant, yet relatively small. Our survey responses were not conducted under the setting of a healthcare encounter which would be necessary to determine the real effect on patient decision making. Finally, it is important to note that while the DA from the USPSTF used for this study was published prior to the official release of their most recent recommendation statement.⁴ However, the DA was reflective of the most recent grade “C” for screening among men age 55 to 69 (Appendix 2).

Strengths of our study include the large number of participants. This allowed for the concurrent comparison of several DAs from high-profile professional societies. Additionally, the randomized nature of the study minimizes both measured and unmeasured biases between the participants assigned to individual DAs.

Conclusions

Exposure to DAs from professional societies increases comfort with the PCa screening decisionmaking process and reduces participant likelihood to undergo or recommend PCa screening. DAs on PCa screening may play a valuable role in educating and empowering patients and their family.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Appendix 1:: Perceptions of Prostate Cancer Screening

Please complete the survey below.

Thank you!

The following identifying information will not be used for any purposes outside of this study and is strictly confidential.

We recognize your time is valuable. If you would like to be considered in a drawing for one of

ten \$100 visa gift cards upon the completion of this study, please provide your contact information below.

Please enter me in the prize drawing

- ☐ Yes
☐ No

What is your full name (please provide to be considered for prize drawing)?

What is your email address (please provide to be considered for prize drawing)?

What is the best phone number to contact you (please provide to be considered for prize drawing)?

What is the best way to reach you?

- ☐ email
☐ phone

Please answer the following demographics questions to the best of your ability.

With which gender do you identify?

- ☐ Male
☐ Female

How old are you in years?

With which race do you identify (choose one)?

- ☐ White
☐ African American
☐ Asian or Pacific Islander
☐ Other

Do you consider yourself to be Hispanic or Latino?

- ☐ Yes
- ☐ No

What is the highest degree you have completed/obtained?

- ☐ High school or less, no diploma
- ☐ High school graduate
- ☐ GED or equivalent
- ☐ Some college or an Associate's degree
- ☐ Bachelor's degree (i.e., BA, AB, BS, BBA)
- ☐ Master's degree (i.e., MA, MS, MEngineering, MEducation, MBA)
- ☐ Professional school degree (MD, DDS, DVM, JD)
- ☐ Nursing degree
- ☐ Doctoral degree (PhD, EdD, ScD)
- ☐ Don't know

Of these income groups, which best represents your total combined household income during last year?

- ☐ \$100,000
- ☐ Don't know

How would you define your marital status?

- ☐ Single (never married)
- ☐ Currently married or living as married
- ☐ Divorced or separated
- ☐ Spouse deceased, not remarried
- ☐ Don't know

How tall are you in inches?

How much do you weigh in pounds?

How do you rate your health in general?

Very unhealthy Very healthy

(Place a mark on the scale above)

Have you ever been told by a doctor or other caregiver that you have diabetes?

- ☐ Yes
- ☐ No

Have you ever been told by a doctor or other caregiver that you have chronic obstructive pulmonary disease (COPD), emphysema, or chronic bronchitis?

- ☐ Yes
- ☐ No

Have you ever been told by a doctor or other caregiver that you have heart disease?

- ☐ Yes
- ☐ No

Have you ever been told by a doctor or other caregiver that you have high blood pressure?

- ☐ Yes
- ☐ No

Has a doctor or other caregiver ever discussed prostate cancer screening with you (if over 40 and male?)

- ☐ Yes
☐ No
☐ Not applicable

Which of the following best describes your cigarette use?

- ☐ Never smoked
☐ Former smoker
☐ Current smoker

Which of the following best describes your health insurance?

- ☐ Private (including individual, family, employer provided, or on any insurance exchange)
☐ Medicaid
☐ Medicare
☐ Other
☐ None

We will now ask you some questions about your experiences with cancer.

Have you ever been diagnosed with any type of cancer?

- ☐ Yes
- ☐ No

If you answered yes to the previous question, what type of cancer? Check all that apply.

- ☐ Oral cavity/pharyngeal
- ☐ Digestive (stomach, small bowel, colorectal, anal, pancreas)
- ☐ Lung
- ☐ muscle, joint
- ☐ Skin
- ☐ Breast
- ☐ Prostate
- ☐ Genitourinary NOT including prostate (bladder, kidney, testes, penis, cervix, vaginal, uterine, ovarian)
- ☐ Endocrine (thyroid, adrenal)
- ☐ Brain

If you answered yes, did you receive treatment for your cancer? Check all that apply.

- ☐ No
- ☐ Yes (surgery)
- ☐ Yes (radiation)
- ☐ Yes (chemotherapy)
- ☐ Yes (other)

If you answered yes, were you cured of your cancer?

- ☐ I'm alive without any cancer
- ☐ I'm alive with cancer

Have you close relatives ever been diagnosed with any type of cancer?

- ☐ Yes
- ☐ No

If you answered yes, what type of cancer? Check all that apply.

- ☐ Oral cavity/pharyngeal
- ☐ Digestive (stomach, small bowel, colorectal, anal, pancreas)
- ☐ Lung
- ☐ muscle, joint
- ☐ Skin
- ☐ Breast
- ☐ Prostate
- ☐ Genitourinary NOT including prostate (bladder, kidney, testes, penis, cervix, vaginal, uterine, ovarian)
- ☐ Endocrine (thyroid, adrenal)
- ☐ Brain
- ☐ Don't know

If you answered yes, did they receive treatment for their cancer? Check all that apply.

- ☐ No
- ☐ Yes (surgery)
- ☐ Yes (radiation)
- ☐ Yes (chemotherapy)
- ☐ Yes (other)
- ☐ Don't know

If you answered yes, did any of your close relatives die from their cancer?

- ☐ Yes
- ☐ No
- ☐ Don't know

Section 1: The next few questions are about your opinion regarding prostate cancer screening.

If a doctor ASKED YOU RIGHT NOW TO MAKE A CHOICE about whether or not you or a loved one should get screened for prostate cancer, what is the likelihood that you will undergo prostate cancer screening or encourage a family member to undergo prostate cancer screening (if you are not male or in the screening age group)?

Not at all likely Extremely likely

 (Place a mark on the scale above)

If a doctor RECOMMENDED you or a loved one to get screened for prostate cancer, what is the likelihood that you will undergo prostate cancer screening or encourage a loved one to undergo prostate cancer screening (if you are not male or in the screening age group)?

Not at all likely Extremely likely

 (Place a mark on the scale above)

Section 2: The next few questions ask about your knowledge and opinions related to prostate cancer screening. Please select one response for each of the statements below.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I know the options available for getting screened for prostate cancer.	☐	☐	☐	☐	☐
I know the differences between screening tests and diagnostic tests for prostate cancer.	☐	☐	☐	☐	☐
I know the benefits of prostate cancer screening.	☐	☐	☐	☐	☐
I know the downsides or risks of prostate cancer screening	☐	☐	☐	☐	☐
I believe the benefits of getting prostate cancer screening outweighs the risks of screening.	☐	☐	☐	☐	☐
I have enough information to make an informed choice about undergoing screening for prostate cancer.	☐	☐	☐	☐	☐
The decision to undergo or recommend others undergo prostate cancer screening is easy for me.	☐	☐	☐	☐	☐
What factors would be most important in making you seek screening or recommend screening for a loved one?	<hr/>				

In general, my knowledge about prostate cancer SCREENING is:

- ☐ Poor
☐ Fair
☐ Good
☐ Very Good
☐ Excellent

Out of 100 men, how many do you think would be

DIAGNOSED of prostate cancer in their lifetime?
Please give us your best estimate, even if you think
your estimate is only a guess.

Out of 100 men, how many do you think will DIE of
prostate cancer in their lifetime? Please give us
your best estimate, even if you think your estimate
is only a guess.

For men age 55 and older, the benefit of prostate
cancer screening outweighs its harm, such as the
inconvenience and discomfort of screening, false
positives, and side-effects of treatment.

- ☐ Not at all
☐ Very little
☐ Somewhat
☐ Quite a bit
☐ A great deal

At what age should men begin prostate cancer
screening?

- ☐ < 40
☐ 40
☐ 55
☐ 70
☐ Different for individual patients

**Section 3: The next few questions are True or False questions. Please state whether each of
the following statements is true or false (your best guess is fine).**

	True	False
The benefit of getting screened for prostate cancer is finding and treating prostate cancer at an early, curable stage.	☐	☐
Getting screened for prostate cancer will prevent an older man from developing prostate cancer.	☐	☐
Getting screened for prostate cancer will reduce the risk of dying from prostate cancer.	☐	☐
Most men who have an abnormal screening test (prostate specific antigen/digital rectal exam) have prostate cancer.	☐	☐
Men over the age of 55 have a higher chance of getting prostate cancer than men under 55.	☐	☐
All men diagnosed with prostate cancer should receive treatment (surgery, radiation, or chemotherapy) for their cancer.	☐	☐
Some prostate cancers found by a screening test would never have shown up or caused problems in a man's lifetime.	☐	☐
Most men with prostate cancer are treated with chemotherapy.	☐	☐
Some men with prostate cancer can be monitored and do not require immediate treatment.	☐	☐
Most clinicians believe men age 55 and older and some younger men at higher risk of prostate cancer should be screened for prostate cancer.	☐	☐
Some men should be screened	☐	☐

for prostate cancer before age 55 based on their risk of prostate cancer death.

The best approach to decide who will be screened for prostate cancer is a shared decision between a doctor and the patient.

We will now present you with a brief decision tool designed to help patients understand if prostate cancer screening is right for them. Please take a few minutes to readh through the pamphlet before responding to the next set of questions.
(NOTE: Please open the link in a separate tab, otherwise you may lose your current progress)

American Society of Clinical Oncology (ASCO) Decision Tool (please click to view attachment)

[Attachment: "ASCO Decision Tool.pdf"]

Section 1: The next few questions are about your opinion regarding prostate cancer screening after reviewing the decision aid.

If a doctor ASKED YOU RIGHT NOW TO MAKE A CHOICE about whether or not you or a loved one should get screened for prostate cancer, what is the likelihood that you will undergo prostate cancer screening or encourage a family member to undergo prostate cancer screening (if you are not male or in the screening age group)?

Not at all likely Extremely likely

 (Place a mark on the scale above)

If a doctor RECOMMENDED you or a loved one to get screened for prostate cancer, what is the likelihood that you will undergo prostate cancer screening or encourage a loved one to undergo prostate cancer screening (if you are not male or in the screening age group)?

Not at all likely Extremely likely

 (Place a mark on the scale above)

	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
I know the options available for getting screened for prostate cancer.	☐	☐	☐	☐	☐
I know the differences between screening tests and diagnostic tests for prostate cancer.	☐	☐	☐	☐	☐
I know the benefits of prostate cancer screening.	☐	☐	☐	☐	☐
I know the downsides or risks of prostate cancer screening.	☐	☐	☐	☐	☐
I believe the benefits of getting prostate cancer screening outweigh the risks of screening.	☐	☐	☐	☐	☐
I have enough information to	☐	☐	☐	☐	☐

make an informed choice about undergoing screening for prostate cancer.

The decision to undergo or recommend others undergo prostate cancer screening is easy for me.

☐ ☐ ☐ ☐ ☐

What factors would be most important in make you seek screening or recommend screening for a loved one?

In general, my knowledge about prostate cancer SCREENING is:

- ☐ Poor
☐ Fair
☐ Good
☐ Very good
☐ Excellent

Out of 100 men, how many do you think would be DIAGNOSED of prostate cancer in their lifetime? Please give us your best estimate, even if you think your estimate is only a guess.

Out of 100 men, how many do you think will DIE of prostate cancer in their lifetime? Please give us your best estimate, even if you think your estimate is only a guess.

For men age 55 and older, the benefit of prostate cancer screening outweighs its harm, such as the inconvenience and discomfort of screening, false positives, and side-effects of treatment.

- ☐ Not at all
☐ Very little
☐ Somewhat
☐ Quite a bit
☐ A great deal

At what age should men begin prostate cancer screening?

- ☐ < 40
☐ 40
☐ 55
☐ 70
☐ Different for individual patients

Section 3: The next few questions are True or False questions. Please state whether each of the following statement is true or false (your best guess is fine).

	True	False
The benefit of getting screened for prostate cancer is finding and treating prostate cancer at an early, curable stage.	☐	☐
Getting screened for prostate cancer will prevent an older man from developing prostate cancer.	☐	☐
Getting screened for prostate cancer will reduce the risk of dying from prostate cancer.	☐	☐
Most men who have an abnormal screening test (prostate specific antigen/digital rectal exam) have prostate cancer.	☐	☐
Men over the age of 55 have a higher chance of getting prostate cancer than men under 55.	☐	☐
All men diagnosed with prostate cancer should receive treatment (surgery, radiation, or chemotherapy) for their cancer.	☐	☐

Some prostate cancers found by a screening test would never have shown up or caused problems in a man's lifetime.	☐	☐
Most men with prostate cancer are treated with chemotherapy.	☐	☐
Some men with prostate cancer can be monitored and do not require immediate treatment.	☐	☐
Most clinicians believe men age 55 and older and some younger men at higher risk of prostate cancer should be screened for prostate cancer.	☐	☐
Some men should be screened for prostate cancer before age 55 based on their risk of prostate cancer death.	☐	☐
The best approach to decide who will be screened for prostate cancer is a shared decision between a doctor and the patient.	☐	☐

Section 4: The next few questions are about the online decision tool on prostate cancer screening that you just read.

Did the decision tool...

	Strongly disagree	Somewhat disagree	Neither	Somewhat agree	Strongly agree
Help you understand the pros and cons of screening for prostate cancer?	☐	☐	☐	☐	☐
Help you make an informed decision about prostate cancer screening for you or your loved one?	☐	☐	☐	☐	☐
Help you identify questions you want to ask your or your loved one's doctor about prostate cancer screening?	☐	☐	☐	☐	☐
Influence your decision to be screened or encourage your loved one to be screened for prostate cancer?	☐	☐	☐	☐	☐
The length of the education pamphlet was:	☐ Much too short ☐ A little too short ☐ Just right ☐ A little too long ☐ Much too long				
The amount of information was:	☐ Much less than needed ☐ A little less than needed ☐ Just right ☐ A little more than needed ☐ Much more than needed				
How clear was the information?	☐ Completely unclear (0%) ☐ Some things were unclear (25%) ☐ Some things were clear (50%) ☐ Most things were clear (75%) ☐ Everything was clear (100%)				
I found the information:	☐ Clearly slanted towards NOT getting screened				

- ☐ A little slanted towards NOT getting screened
☐ Completely balanced
☐ A little slanted towards getting screened
☐ Clearly slanted towards getting screened

How much do you trust the information in the decision tool?

- ☐ Not at all
☐ A little bit
☐ Somewhat
☐ Mostly
☐ Completely

How likely are you to recommend this resource to a friend or family members that is considering screening for prostate cancer?

- ☐ Very unlikely
☐ Somewhat unlikely
☐ Neutral
☐ Somewhat likely
☐ Very likely

Here is a summary of the current recommendations from the sponsoring organization of the decision tool that you have just read. The full recommendation is available at the URL provided. Please read the summary bullet points before continuing to the last few questions.

American Society of Clinical Oncology (ASCO) Recommendations:

-Screening is not recommended for men with life expectancy of less than 10 years.

-In men with life expectancy greater than 10 years, it is recommended that physicians discuss with patients whether or not PSA testing is appropriate.

Source: <http://ascopubs.org/doi/full/10.1200/jco.2012.43.3441>

Section 5: The next few questions are about your opinion regarding prostate cancer screening after reviewing the recommendation of the clinical society above.

Now that you have seen this organization's recommendation, if a doctor ASKED YOU RIGHT NOW TO MAKE A CHOICE about whether or not you or a loved one should get screened for prostate cancer, what is the likelihood that you undergo prostate cancer screening or encourage a family member to undergo prostate cancer screening (if you are not male or in the screening age group)?

Not at all likely Extremely likely

=====

(Place a mark on the scale above)

Now that you have seen this organization's recommendation, if a doctor RECOMMENDED prostate cancer screening, what is the likelihood that you will undergo prostate cancer screening or encourage a loved one to undergo prostate cancer screening (if you are not male or in the screening age group)?

Not at all likely Extremely likely

=====

(Place a mark on the scale above)

What influenced your decision more, the decision tool or the society's recommendation?

Decision tool Equal

=====

(Place a mark on the scale above)

Appendix 2:: Professional society recommendation summaries

Professional Society	Summary of Current Recommendations	Source
American Society of clinical Oncology (ASCO)	-Screening is not recommended for men with life expectancy of less than 10 years. -In men with life expectancy greater than 10 years, it is recommended that physicians discuss with patients whether or not PSA testing is appropriate.	http://ascopubs.org/doi/full/10.1200/jco.2012.43.3441
American Cancer Society (ACS)	-Screening is not recommended for men with life expectancy of less than 10 years. -In men with life expectancy greater than 10 years, discussion with physician is recommended to begin at age 50 for those at average risk -Age 45 for those who are high risk (including African Americans and men with first-degree relatives diagnosed with prostate cancer younger than 65) -Age 40 for men at even higher risk (those with more than one first-degree relative who had prostate cancer younger than 65)	https://www.cancer.org/cancerprostate-cancer/early-detection/acs-recommendations.html
Centers for Disease Control (CDC)	-Screening is not recommended for men over the age of 70. -Men ages 55-69 are recommended to discuss with their physician about whether or not prostate cancer screening is appropriate.	https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/prostate-cancer-screening1
United States Preventive Services Task Force (USPSTF)	-Screening is not recommended for men over the age of 70. -Men ages 55-69 are recommended to discuss with their physician about whether or not prostate cancer screening is appropriate.	https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/prostate-cancer-screening1
American Academy of Family Physicians (AAFP)	-Screening for prostate cancer is not recommended. -It is recommended that a discussion between physicians and appropriate men take place	http://www.aafp.org/patient-care/clinical-recommendations/all/cw-prostate-cancer.html

Professional Society	Summary of Current Recommendations	Source
American Urological Association (AUA)	<p>every one to two years.</p> <p>-No screening for men under 40 years of age.</p> <p>-No screening for men 40-55 years of age at average risk of death from prostate cancer (no family history and not African American).</p> <p>-Men age 40-54 with a family history or of African American race may consider screening after a discussion with their physician.</p> <p>-Screening is recommended for men age 55-69 after discussion with a physician about the patient's values and preferences. Most men can be screened every two years instead of annually.</p>	http://www.auanet.org/guidelines/early-detection-of-prostate-cancer-(2013-reviewed-and-validity-confirmed-2015)

¹The Centers for Disease Control defers to the recommendation from the United States Preventive Services Task Force

Key of definitions of abbreviations

DA	Decision aid
PCa	Prostate cancer
PSA	Prostate-specific antigen
ASCO	American Society of Clinical Oncology
ACS	American Cancer Society
CDC	Centers for Disease Control
USPSTF	United States Preventive Services Task Force
AAFP	American Academy of Family Physicians
AUA	American Urological Association

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Figure 1 a-b:

Change in likelihood to undergo or recommend prostate cancer screening following decision aid exposure if participants had to make decision (a) with no physician recommendation or (b) with a physician recommending screening. Participants selected their likelihood on a 100-point scale with 100 being “extremely likely.” Error bars are 95% confidence intervals. Abbreviations: ASCO, American Society of Clinical Oncology; ACS, American Cancer Society; CDC, Centers for Disease Control; USPSTF, United States Preventive Services Task Force; AAFP, American Academy of Family Physicians; AUA, American Urological Association.

Figure 2:

Comparing the effect of decisions aids on perception of prostate cancer screening
Multivariable linear regression analyses were done to assess the association between decision aid and change likelihood to undergo or recommend prostate cancer screening following exposure to a decision aid, change in comfort with prostate cancer screening, perceived quality of decision, and perceived bias of decisions aid. All covariates in table 3 were also included in this regressions.

Abbreviations: CI, confidence interval; ASCO, American Society of Clinical Oncology; ACS, American Cancer Society; CDC, Centers for Disease Control; USPSTF, United States Preventive Services Task Force; AAFP, American Academy of Family Physicians; AUA, American Urological Association

Figure 3:

Change in comfort with prostate cancer screening following decision aid exposure Comfort with prostate cancer screening was determined by the average of six, five-point Likert-scale questions to create a composite comfort score with higher scores representing increased comfort. Error bars are 95% confidence intervals.

Abbreviations: ASCO, American Society of Clinical Oncology; ACS, American Cancer Society; CDC, Centers for Disease Control; USPSTF, United States Preventive Services Task Force; AAFP, American Academy of Family Physicians; AUA, American Urological Association

Figure S:

Participant perspective of decision aid quality measures Decision aid quality was assessed based on six, five-point Likert-scale questions. A composite quality score was calculated by averaging the six questions. Error bars are 95% confidence intervals.

Abbreviations: ASCO, American Society of Clinical Oncology; ACS, American Cancer Society; CDC, Centers for Disease Control; USPSTF, United States Preventive Services Task Force; AAFP, American Academy of Family Physicians; AUA, American Urological

Table 1:

Association between covariates and likelihood to undergo or recommend prostate cancer screening

Covariate	Likelihood to undergo or recommend prostate cancer screening	
	Change (95% CI)	p
Age		
Continuous per 1 year	0.00 (−0.02 to 0.03)	0.7
Sex		
Male	Reference	
Female	1.24 (−2.72 to 5.21)	0.5
Race		
White	Reference	
Black	5.41 (−0.90 to 11.72)	0.093
Hispanic	0.61 (−6.93 to 8.14)	0.9
other	−1.52 (−7.39 to 4.35)	0.6
Education		
Part or all of high school or some college	Reference	
College	0.06 (−3.66 to 3.78)	0.9
Master's degree	−1.13 (−5.10 to 2.85)	0.6
Professional or doctoral degree	−8.37 (−13.06 to −3.69)	<0.001
Annual Income, \$1,000		
≤35	Reference	
36–65	−1.83 (−5.61 to 1.95)	0.3
66–100	−0.42 (−4.23 to 3.40)	0.8
>100	−6.75 (−11.13 to −2.38)	0.003
Unknown	0.50 (−7.40 to 8.40)	0.9
Health Insurance		
Private	Reference	
Medicaid	3.42 (−4.38 to 11.22)	0.4
Medicare	1.31 (−2.37 to 4.98)	0.5
Other	−2.47 (−9.27 to 4.34)	0.5
None	−0.36 (−8.43 to 7.71)	0.9
Marital status		
Single (never married)	Reference	
Currently married or living as married	0.74 (−2.88 to 4.35)	0.7
Spouse deceased, not remarried	2.49 (−5.59 to 10.57)	0.5
Divorced or separated	6.37 (1.85 to 10.89)	0.006
Comorbidities		
0	Reference	
1	1.56 (−1.67 to 4.79)	0.3
>1	3.35 (−0.52 to 7.22)	0.089

Covariate	Likelihood to undergo or recommend prostate cancer screening	
Smoking status		
Never	Reference	
Former	0.05 (−3.02 to 3.12)	0.9
Current	3.09 (−2.58 to 8.77)	0.3
Personal cancer status		
No history of cancer	Reference	
Cured of cancer	2.51 (−1.13 to 6.15)	0.2
Alive with cancer	0.36 (−10.28 to 11.00)	0.9
Close relative with cancer		
No	Reference	
Yes, not dead from cancer	7.61 (0.02 to 1.93)	0.016
Yes, dead from cancer	8.91 (0.01 to 2.91)	<0.001
Yes, unclear if dead from cancer	0.37 (−16.30 to 17.03)	0.9
Previous prostate cancer screening discussion with caregiver		
No	Reference	
Yes	5.78 (1.34 to 10.22)	0.011

Multivariable linear regression analyses were done to assess the association between covariates and the likelihood to undergo or recommend prostate cancer screening