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TITLE: Patient Race and Outcome Preferences as Predictors of Urologists' Treatment Recommendations and Referral Patterns in Early-Stage Prostate Cancer

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14. ABSTRACT: This is a nationally-representative mailed survey of 2000 urologists to (1) collect information about physician sociodemographics and clinical practice characteristics and (2) relate this information to treatment recommendations in three clinical vignettes. The vignettes will allow for assessments of the independent effects of patient race, age, socioeconomic status, and tumor characteristics on urologist treatment recommendations. A major component of this work is disparities research, seeking to understand whether physician factors might influence previously well-described black-white differences in patterns of care for localized prostate cancer. To date, we have completed all survey mailings, collected responses, entered these into an Access database, and have initiated preliminary analyses. The response rate was 66.1%, which is excellent for a survey of this type and was made possible by closely following the Dillman method. Manuscripts in preparation will highlight the following findings (and others, to be determined): the percentage of minority urologists is extremely small (approximately 4%), grossly out of proportion to the patient population they treat. The vast majority of urologists perform fewer than 2.5 radical prostatectomies per month, raising significant concerns about surgical skill and outcomes. In a hypothetical vignette, patient socioeconomic status, not race, influenced treatment recommendations for localized prostate cancer. A majority of urologists rate their own surgical outcomes as better than the national average, and a significant proportion provide erroneous information about comparative outcomes for major treatment modalities (favoring prostatectomy in the process). Additional analyses are underway and we are planning a follow-up survey and telephone interviews of a selected group within the original sample.					
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Introduction

Task 1, the development and pretesting of the survey with the assistance of prostate cancer specialists is complete. The survey designed for this study was developed with the assistance of Fernando Kim, MD, UCHSC, and Robert Flanigan, MD, Loyola University, both urologists. The survey was pre-tested and refined with the assistance of 25 practicing urologists in the Denver, Colorado area. Based on piloting the survey, it was determined that the average time to complete the survey was about 10 minutes.

The survey (Appendix A) was mailed to a nationally-representative sample of 2,000 U.S. urologists to (1) collect information about physician sociodemographics and clinical practice characteristics and (2) relate this information to treatment recommendations in three clinical vignettes.

Body

The vignettes will allow for assessments of the independent effects of patient race, age, socioeconomic status, and tumor characteristics on urologist treatment recommendations. A major component of this work is disparities research, seeking to understand whether physician factors might influence previously well-described black-white differences in patterns of care for localized prostate cancer. See Introduction (page 14) and Methods (pages 15-17) in Appendix B for details.

Key research accomplishments

To date, we have completed all survey mailings, collected responses, entered these into an Access database, and have initiated preliminary analyses. Moreover, we have completed analyses of vignette 2, which assesses the influence of patient race and social vulnerability on urologist treatment recommendations in early-stage disease. See attached manuscript (Appendix B), currently under review at Medical Care.

Reportable Outcomes

The response rate was 66.1%, which is excellent for a survey of this type and was made possible by closely following the Dillman method. Manuscripts in preparation will highlight the following findings (and others, to be determined): the percentage of minority urologists is extremely small (approximately 4%), grossly out of proportion to the patient population they treat. The vast majority of urologists perform fewer than 2.5 radical prostatectomies per month, raising significant concerns about surgical skill and outcomes. See Results in Appendix B (pages 18-19) and Tables 1-3 in Appendix B (pages 30-31).

Conclusions

In a hypothetical vignette, patient socioeconomic status, not race, influenced treatment recommendations for localized prostate cancer. A majority of urologists rate their own surgical outcomes as better than the national average, and a significant proportion provide erroneous information about comparative outcomes for major treatment modalities (favoring prostatectomy in the process). Additional analyses are underway of the two other vignettes, and producing manuscripts that summarize other findings pertaining to urologist RP and brachytherapy volume and urologist perceptions of outcomes associated with major treatment modalities and we are planning a follow-up survey and telephone interviews of a selected group within the original sample. See Discussion in Appendix B (pages 20-25).

References

See Appendix B (pages 26-29)

University of Colorado Health Sciences Center

Localized Prostate Cancer Research Group

SURVEY

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Fernando J. Kim, MD, Chair of Urology, Denver Health Medical Center, University of Colorado

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SECTION 1:

Vignette 1: Please consider the following information and then offer a treatment recommendation:

Patient: 77 year-old white male

Social: Married, retired furniture salesman, lives close to a major medical center, no transportation barriers.

Insurance: Medicare

Diagnosis: Localized (organ-confined) prostate cancer (TRUS=DRE;
No nodule)

Gleason grade: 3+3

Biopsy: 2 out of 12 cores on the left each had 10% tumor

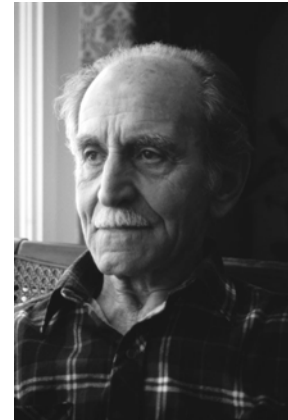
PSA: 5.4 (obtained by primary care provider)

CT scan: No evidence of regional lymph node involvement

Bone scan: Negative

Prostate size: 30 grams

Family history of prostate cancer: None



AUA symptom score: 7 (i.e. mild urinary symptoms)

Sexual function: Normal erections satisfactory for intercourse

Comorbidities: Gout, on allopurinol and a daily aspirin. Otherwise healthy and active.

Patient concerns: Patient understands the potential side effects of all treatment alternatives.

He says, “cure is not as important as enjoying life – everyone has to die sometime.”

He also says, “I would not be greatly bothered by urinary leakage and could wear pads if I had to. As far as sex is concerned, my wife and I enjoy it but could easily adjust to living without it.”

He is anxious to know your treatment advice and is willing to carry through with anything you recommend.

Given the following four options only, please indicate which one you are *more likely* to recommend (**mark only one answer**):

____ Radical prostatectomy with optional nerve sparing

____ A form of radiation: ____brachytherapy OR ____external beam

____ Observation (or “watchful waiting”)

____ Cryotherapy

In the year 2005, would you refer this patient to a medical oncologist to discuss or assist with treatment?

____ Almost certainly ____ Probably ____ Doubtful ____ Definitely not

Vignette 2: Please consider the following information and then offer a treatment recommendation:

Patient: 70 year-old African American male.

Social: Married, retired electrical engineer, lives close to a major medical center, wife is very concerned.

Insurance: Medicare

Diagnosis: Localized (organ-confined) prostate cancer (TRUS=DRE;
No nodule)

Gleason grade: 3+3

Biopsy: 2 out of 12 cores on the left each had 10% tumor

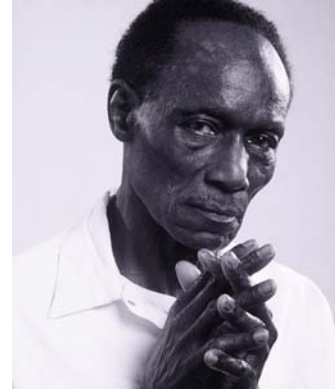
PSA: 3.2 (was 4.8 two years ago, by primary care provider)

CT scan: No evidence of regional lymph node involvement

Bone scan: Negative

Prostate size: 35 grams

Family history of prostate cancer: None



AUA symptom score: 6 (i.e. mild urinary symptoms)

Sexual function: Normal erections satisfactory for intercourse

Comorbidities: Essential hypertension on an ACE-inhibitor. Otherwise healthy and active.

Patient concerns: Patient understands the potential side effects of all treatment alternatives.

He says he wants a chance at cure more than anything but very much wants to avoid treatment that interferes with his sexual function.

He is anxious to know your treatment advice and is willing to carry through with anything you recommend.

Given the following four options only, please indicate which one you are *most likely* to recommend (**mark only one answer**):

- ☐ Radical prostatectomy with optional nerve sparing
- ☐ A form of radiation: ☐ brachytherapy OR ☐ external beam
- ☐ Observation (“watchful waiting”)
- ☐ Cryotherapy

If given the opportunity, would you recommend a form of hormonal therapy instead of, or as an adjunct to, your choice, above?

- ☐ Hormonal therapy alone (i.e. instead of above choice)
- ☐ Hormonal therapy as an adjunct to above choice
- ☐ No hormonal therapy

Vignette 3: Please consider the following information and then offer a treatment recommendation:

Patient: 66 year-old white male

Social: Married real-estate agent, lives close to a major medical center, no transportation barriers.

Insurance: Medicare

Diagnosis: Localized (organ-confined) prostate cancer (TRUS=DRE;
No nodule)

Gleason grade: 3+3

Biopsy: 2 out of 12 cores on the left each had 10% tumor

PSA: 5.7 (obtained by primary care provider)

CT scan: No evidence of regional lymph node involvement

Bone scan: Negative

Prostate size: 45 grams

Family history of prostate cancer: None



AUA symptom score: 12 (i.e. moderate urinary symptoms)

Sexual function: Normal erections satisfactory for intercourse

Comorbidities: Takes a daily aspirin, a statin, and a multivitamin. Had a “small” myocardial infarction five years ago with a single stent of his right coronary artery. He has excellent exercise tolerance and no cardiac symptoms. He walks about one mile a day.

Patient concerns: This patient understands the potential side effects of all treatment alternatives.

He says, “My urinary leakage is not a big problem – if I had to, I could wear pads.”

He also says, “my wife and I enjoy occasional sex, but we could easily adjust to living without it.”

He is anxious to know your treatment advice and is willing to carry through with anything you recommend.

Given the following four options only, please indicate which one you are *most likely* to recommend (**mark only one answer**):

- ☐ Radical prostatectomy with optional nerve sparing
- ☐ A form of radiation: ☐ brachytherapy OR ☐ external beam
- ☐ Observation (“watchful waiting”)
- ☐ Cryotherapy

If given the opportunity, would you recommend a form of hormonal therapy instead of, or as an adjuvant/neoadjuvant to, your choice, above?

- a. ☐ No hormonal therapy
- b. ☐ Hormonal therapy alone (i.e. instead of above choice)
- c. ☐ Hormonal therapy as an adjunct to above choice

If (b) or (c) checked, above, please indicate preferred therapy (check more than one for combination therapy):

- ☐ orchiectomy
- ☐ LHRH analog (e.g. leuprolide, goserelin)
- ☐ anti-androgen (e.g. bicalutamide, flutamide)

SECTION 2:

Please circle your answers to the following questions:

1. For Gleason grade 8-10 localized prostate cancers, rates of cure are

- X **higher with prostatectomy than radiation (external beam or seeds)**
- X **roughly the same with prostatectomy and radiation (external beam or seeds)**
- X **higher with radiation (external beam or seeds) than with prostatectomy**

2. With nerve-sparing prostatectomy, national rates of *any* form of long-term incontinence are:

<25% 26-50% 51-75 >75%

3. Different urologists treat different patient populations. Compared with the national average, your *own* surgical rate of long-term incontinence associated with nerve-sparing prostatectomy is:

lower about the same higher

4. With nerve-sparing prostatectomy and early oral phosphodiesterase-5 enzyme inhibitor treatment (e.g. Viagra), average national rates of long-term impotence (inability to sustain an erection for intercourse) are:

<25% 26-50% 51-75 >75%

5. Different urologists treat different patient populations. Compared with the national average, your *own* surgical rate of long-term impotence associated with nerve-sparing prostatectomy is:

lower about the same higher

6. In general, external conformal beam radiation has better long-term urinary incontinence outcomes than prostatectomy:

True False

7. In general, external conformal beam radiation has better long-term sexual function outcomes than prostatectomy:

True False

8. In your practice, all else being equal, married men with localized prostate cancer are more likely than unmarried men to have prostatectomy as opposed to a form of radiation

True False

9. There is an ongoing adjuvant trial for high risk prostate cancer for patients following radical prostatectomy (SWOG 9921). All receive 2 years of hormone therapy and 50% receive 6 cycles of chemotherapy.

* Are you aware of this trial? yes _____ no _____

* Would you be willing to enroll qualifying patients (5 - very likely; 1 - unlikely): 5 4 3 2 1

* Would decreasing reimbursement for GnRH analogs have any effect on your willingness to collaborate with medical oncologists in order to enter patients into this trial?

No effect _____ Some effect _____ Large effect _____

SECTION 3: Please provide the following information about yourself and your clinical practice:

1. Your age: _____

2. Your race/ethnicity: **White, non-Latino / African American / Latino / Asian or Pacific Islander / Other**

3. How many years have you been practicing urology? ____

4. Did you complete a fellowship in urologic oncology?

Yes

No

5. In your clinical practice, the percentage of white, non-Latino patients is:

<10%

10-30%

31-60%

>60%

6. In your clinical practice, the percentage of African American patients is:

<10%

10-30%

31-60%

>60%

7. In your clinical practice, the percentage of Latino patients is:

<10%

10-30%

31-60%

>60%

8. Please circle the average number of *prostatectomies* that you perform per year:

None

1-10

11-30

>30

9. Please circle the average number of *brachytherapy procedures* that you perform/assist per year:

None

1-10

11-30

>30

10. What percentage of the time do you refer your localized prostate cancer patients to a radiation oncologist for discussion of radiation as possible primary therapy?

<10%

10-25%

26-50%

51-75%

>75%

11. What percentage of the time do you refer your *high risk* localized prostate cancer patients to a medical oncologist for a second opinion and possible adjuvant therapy?

<10%

10-25%

26-50%

51-75%

>75%

12. Which best describes your clinical practice:

Academic

Private-practice

13. What is the bed size of the largest hospital in which you usually practice:

<100

101-300

>300

Thank you for your participation!
Please feel free to provide any comments in the space below

Appendix B: manuscript submitted to Medical Care 1/06

THE INFLUENCE OF PATIENT RACE AND SOCIAL VULNERABILITY ON UROLOGIST TREATMENT RECOMMENDATIONS IN LOCALIZED PROSTATE CARCINOMA

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Key words: health disparities, localized prostate carcinoma, treatment, social support, socioeconomic status

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Abstract

BACKGROUND: In localized prostate carcinoma (PCa), many studies have found that blacks receive radical prostatectomy (RP) less often than whites. Such disparities involve barriers to health care, comorbid illnesses, tumor characteristics, and patient preferences. It is unclear whether differences in urologist treatment recommendations also play a role.

METHODS: Using a randomized, 2x2 factorial design we presented 2,000 urologists with a clinical vignette and asked them to recommend treatment for a healthy 70-year-old patient with low-risk, clinically localized PCa. Options included either RP, external beam radiotherapy, brachytherapy, cryotherapy, observation, or hormonal therapy. There were two variables within four otherwise identical versions of the vignette: (1) patient race (black vs. white) and (2) socioeconomic vulnerability (middle-income and married versus low-income and unmarried). We used multivariable logistic regression to model the effects of patient race, socioeconomic vulnerability, and their interaction on recommendations for RP vs. radiotherapy.

RESULTS: The response rate was 66.1% (n=1,313). Race and social vulnerability interacted ($p=0.05$) such that the highly vulnerable black patient received an RP recommendation 14.4% less often than his less vulnerable counterpart; the difference between the two white patients was 4.2%.

DISCUSSION: Race interacts with social vulnerability to influence urologist recommendations for RP. Because PCa tends to be more lethal in blacks, urologists may view such patients as good candidates for RP. However, black race may amplify perceptions of social vulnerability, heightening urologists' concerns about poor surgical outcomes and follow-up. Physicians should avoid assumptions and base treatment recommendations on patients' actual financial resources and social networks.

Background

Racial and ethnic disparities in cancer treatment have been widely documented.¹ For localized prostate carcinoma, numerous studies over the past decade have reported that blacks receive radical prostatectomy significantly less often than whites.²⁻¹³ Several studies have also found that blacks receive less curative therapy overall (prostatectomy *or* radiation).^{3 4 11 13-15} Disparities in treatment are likely to involve structural barriers to health care, comorbid illnesses and tumor characteristics, and patient treatment preferences.¹⁶ Differences in physician treatment recommendations may also be implicated, but this is poorly understood. Because physicians do not generally furnish researchers with information about treatment recommendations for actual patients, we surveyed a national sample of urologists to evaluate how a patient's race and level of social vulnerability in a clinical vignette would influence their recommendations for radical prostatectomy and curative therapy.

Methods

We selected physicians who listed their specialty as Urology from the American Medical Association (AMA) Master List of Physicians. Based on AMA data fields, we excluded trainees, pediatric urologists, and urologists uninvolved in patient care. We further limited our sampling to urologists who were linked by unique identifiers to the National Drug Council (NDC) database as prescribers of hormonal therapies (the All Antineoplastic Antimetabolites therapeutic class). These criteria were designed to identify urologists directly involved in the treatment of prostate carcinoma. Out of a total of 6,104 urologists who met these criteria, we selected a random sample of 2,000 to receive a mailed survey.

Following Dillman methodology for survey design,¹⁷ and modeled on a previous survey by Fowler, et al.,¹⁸ we mailed an introductory letter followed a week later by a pre-tested survey, cover letter, \$10 cash incentive, and postage-paid return envelope. A reminder letter followed a week later. We informed urologists that individual survey responses were confidential and that the purpose of the study was to better understand national patterns of care for early-stage prostate cancer. Beyond this brief description, we did not mention specifics, including our interest in assessing the potential influence of patient race on treatment recommendations. Urologists who failed to return the survey after a month received another copy of the survey with a reminder letter. Non-respondents at two months received by overnight post a third and final copy of the survey. With each mailing, we gave urologists the option to indicate on a postage-paid return postcard whether they were retired or did not wish to participate in the study. In the former case, we removed them from the denominator; in the latter case, we sent no additional mailings but retained them in the sample as non-respondents. In the event that a non-completed survey was returned by the post office and we were unable to determine a correct address, we substituted randomly another urologist who practiced in the same town or city.

The survey collected information about urologist sociodemographic and clinical practice characteristics, including age, gender, years in practice, type of practice (academic versus private), fellowship training in urologic oncology, annual procedure volume for radical prostatectomy and brachytherapy, and African American and Latino composition of patients seen in practice. The size of the metropolitan area of each urological practice was derived from cross-referencing each urologist zip code to its United States Census Core Based Statistical Area (CBSA). The survey included a clinical vignette (see Appendix) that asked urologists to make a treatment recommendation for a 70 year-old, generally healthy and active patient, who had moderate grade, low-risk (Gleason 3+3, PSA 3.2), clinically localized prostate carcinoma. The vignette specified that the patient's erectile function was satisfactory for intercourse, his urinary symptoms were mild (AUA symptom score of 6), and he had Medicare coverage and lived close to a major medical center. The patient was interested primarily in cure but, to the extent possible, he also wanted to avoid treatment that would interfere with his sexual function. We asked urologists to recommend a single form of treatment that could include either radical prostatectomy, external beam radiotherapy, brachytherapy, cryotherapy, and observation ("watchful waiting"). Hormonal therapy could be selected in addition to, or instead of, these other options.

Using a 2x2 factorial design we produced four versions of the vignette. The patient's medical characteristics, insurance status, geographic proximity to treatment, and preferences for cure and side effects were identical in each, but two other elements varied dichotomously: (1) the patient's race (black vs. white, incorporating an appropriate photograph) and (2) his level of socioeconomic vulnerability. Socioeconomic vulnerability influences susceptibilities, responses, and outcomes of illness, and is influenced by traits such as age, physical and mental disability, family structure, social networks, income and material resources, and housing.¹⁹ The patient in the vignette was either "widowed, unemployed, and living in low-income housing" (high vulnerability) or else he was "a retired electrical

engineer with a very concerned wife” (low vulnerability). At random, each urologist received one version of the vignette.

We used multivariable logistic regression to model the effects of patient race, socioeconomic vulnerability, and the interaction between these two variables on recommendations for (1) radical prostatectomy versus radiotherapy (external beam or brachytherapy), and (2) curative therapy (radical prostatectomy, radiotherapy, *or* cryotherapy) versus watchful waiting. We displayed our results in terms of bivariate associations between patient race, social vulnerability, and race-social vulnerability interactions, on the one hand, and urologist treatment recommendations, on the other. We also computed relative risks and risk differences between each of the two possible main effects (race and social vulnerability) and for both races stratified by social vulnerability. All statistical analyses were conducted by use of SAS (SAS Institute, Inc., Cary, NC).

This study was approved by the Colorado Multiple Institutional Review Board (COMIRB).

Results

The response rate was 66.1% (n=1,313), excluding 15 urologists who returned a postcard indicating they were retired. There were no differences between respondents and non-respondents in terms of age, gender, metropolitan size of practice location, region of the country, or number of prescriptions generated quarterly for hormonal therapy. Table 1 summarizes the demographic and clinical practice characteristics of the respondents. The sample was overwhelmingly white (83.3%), male (97.9%), and had been in practice for an average of 19.5 years. Approximately 7% had completed a fellowship in urologic oncology and 93% were in private practice. Large majorities (88.1%) practiced in a metropolitan area with a population of at least 50,000 and had fewer than 10% African American or Latino patients in their practices. The distribution of Table 1 variables was similar for recipients of each version of the vignette.

For all vignette versions combined 6.4% of urologists recommended watchful waiting and 93.5% recommended some form of curative therapy: radical prostatectomy (29.3%), radiotherapy (62.3%), or cryotherapy (1.8%). Of those recommending radiotherapy, and without difference based on vignette version, brachytherapy was the overwhelming choice (85.1%). Adjunctive hormonal therapy was recommended by 11.9% of urologists.

Table 2 summarizes the impact of race and socioeconomic vulnerability on urologist treatment recommendations. Social vulnerability influenced recommendations for radical prostatectomy (RP) over radiotherapy (XRT) such that the less vulnerable black and white patients combined received an RP recommendation 9.3% more often than their highly vulnerable counterparts ($p=0.0005$). There was also a race-social vulnerability interaction ($p=0.05$). The less vulnerable black patient received an RP

recommendation 14.4% more often than the highly vulnerable black patient, while the difference was 4.2% for the two white patients.

Social vulnerability also had a significant, albeit small, overall effect on recommendations for watchful waiting ($p=0.004$, Table 3). The highly vulnerable black and white patients combined received a watchful waiting recommendation 4.2% more often than their less vulnerable counterparts. The highly vulnerable white patient received a watchful waiting recommendation 6.9% more often than the less vulnerable white patient while the difference was 1.3% between the two black patients. There was, however, no significant race-social vulnerability interaction in this model.

Discussion

Based on a clinical vignette, we found that a patient's social vulnerability strongly influenced urologists' treatment recommendations for localized prostate carcinoma. The more vulnerable patients experienced lower rates of recommendation for both curative therapy and radical prostatectomy. Race also interacted with social vulnerability to influence the selection of radical prostatectomy for black patients, specifically. These findings support the idea that while race and social class are both important in health disparities, the latter has a more powerful effect.^{20 21} In addition, our results offer further evidence that race-social class interactions, which are often overlooked in health disparities research, are important across a large number of health conditions.²²⁻²⁵

To our knowledge, this is the first study to describe, using methodology that minimizes the influence of unmeasured confounders, how urologist treatment recommendations for prostate cancer are influenced by a patient's race and socioeconomic circumstances. Because black race is closely intertwined with poverty and social isolation, it has been difficult to separate these variables in population-based research. To the extent that a hypothetical scenario illuminates clinical decision-making in the real world, this study is noteworthy because it elucidates the influence of these variables individually and in combination. In addition, our results show that non-clinical factors, such as social vulnerability, exert a strong influence on physician recommendations. This is particularly relevant because physician recommendations are often the most important determinants of treatment that patients receive.²⁶

Black race may influence urologist perceptions of social vulnerability

In our vignette, a highly vulnerable black patient received the lowest overall rate of recommendation for radical prostatectomy while his less socially vulnerable counterpart received the highest. The difference, quite large, was 14.4% and compares with a 4.2% difference between the two white patients

whose degree of social vulnerability was described in identical terms. These results lead us to suspect that black race modifies the influence of socioeconomic factors on recommendations for prostatectomy.

Because prostate cancer has higher rates of biochemical recurrence²⁷ and tends to be more lethal in blacks than whites,⁴ urologists may feel that married, middle-class black patients with moderate-grade, low-PSA tumors are good candidates for prostatectomy, which urologists regard as the most definitive option for cure.¹⁸ In comparison, urologists may reason that socioeconomically disadvantaged patients are less appropriate for surgery. Such patients might be more likely to experience post-operative complications and require longer hospital stays. Analgesia, diet, fluid intake, bowel habits, physical activity, and Foley catheter hygiene require careful attention in the post-operative period. Patients who are less-educated and socially isolated may have significant difficulties with these details. Second, socially vulnerable patients may have poorer adherence to follow-up, including regular PSA surveillance. Finally, urologists may assume that such patients are less likely to accept surgery if offered. While it is unknown whether socially vulnerable patients are indeed less adherent, have fewer preferences for, and experience worse outcomes following radical prostatectomy, urologists may nonetheless harbor such concerns. In cardiovascular disease, for example, one study found that patients' socioeconomic status strongly influenced physician perceptions of patient intelligence and likelihood of having social supports and adhering to medical advice.²⁰ Powe, *et al.* also found that physicians perceive socioeconomically disadvantaged patients as having higher rates of medical non-adherence, adversely influencing their referrals for kidney transplantation.²⁸

Ultimately, urologists may assume that patients who are socially disadvantaged *and* black are especially susceptible to poor outcomes and follow-up. In other words, black race may amplify their perceptions of social vulnerability and its adverse consequences. Social vulnerability is a broad concept that

incorporates a variety of components including not only income and education, but also age, gender, housing, and the nature of social networks, including marriage.¹⁹ In fact, blacks tend to be more socially vulnerable than whites across similar socioeconomic strata,²⁹ and they commonly suffer from a higher incidence of cancers as well as lower quality health care and poorer outcomes.³⁰ It is noteworthy, for example, that black men with localized prostate carcinoma are much more likely to be unmarried than their white peers.^{2 6 26} Black race by itself, of course, also contributes to social vulnerability because of its direct connection to racism and residential segregation which, in turn, adversely influences such things as access to transportation and health care, employment opportunities, neighborhood costs of goods and services, and the ability to accumulate wealth (e.g. car and home ownership).³¹

In this study, we contrived to separate race from other aspects of social vulnerability. Our results are consistent with an interpretation that knowledge of race modifies urologists' *perceptions* of a patient's social vulnerability. If accurate, it is unclear whether such perceptions would be shaped by reality-based probabilities, or whether they would instead reflect unwarranted biases or stereotypes. Both possibilities have some merit.²⁰

The vignette in relation to prior studies of prostate cancer treatment

In evaluating predictors of treatment for localized prostate carcinoma, population-based studies that did *not* consider aspects of socioeconomic vulnerability (e.g. income, occupation, education, marital status, and neighborhood characteristics) all reported significant black-white differences in receipt of prostatectomy or curative therapy.^{4 5 7 9 11-14} Others reported treatment differences by both race and SES.^{3 8 10} Recent studies that have included a more robust set of predictive variables, including comorbidity scores, measures of SES, and marital status (a key type of social support), produced variable results.^{2 6 15 26} One of these, utilizing a census-based measure of SES, found racial differences in

rates of prostatectomy, but not curative therapy.² It also found that SES had a small influence on both categories of treatment while marriage conferred substantial 24% and 28% greater relative risks for prostatectomy and curative therapy, respectively. Another study, using an individual-level measure of SES, found no treatment differences by race, but did report data showing significantly lower rates of prostatectomy among lower-income patients.²⁶ Although subject to possible respondent bias and limitations in the measurement of SES,³² two of the most comprehensive analyses, using data from the Prostate Cancer Outcomes Study (PCOS), did not find treatment differences by SES but did report significantly greater receipt of curative therapy (but not prostatectomy) among married compared with unmarried men.^{6 15} Both of these studies also reported racial differences, but these were contingent on other factors. In Hoffman et al.,⁶ blacks received less prostatectomy than whites only for more aggressive disease (PSA $\geq$ 20 ng/mL or Gleason score $\geq$ 8) and, in Harlan et al.,¹⁵ blacks received less curative therapy than whites only over age 60.

It is important to note that our study is not directly comparable to these others because it focused on only four hypothetical patients and did not evaluate other important influences on treatment such as patient age, tumor characteristics, comorbid conditions, and patient treatment preferences. Nonetheless, our results are consistent with at least one key finding that seems to have emerged from this prior work.

We found that race did not exert a main effect but instead modified the influence of socioeconomic factors on physician treatment recommendations. Similarly, in the literature described above, racial disparities became less evident or were found to be contingent on other factors (such as age and tumor grade) when predictive models were expanded to include SES and marital status. Thus, in both instances race was secondary to socioeconomic variables in predicting treatment or treatment recommendations.

The importance of marriage as an aspect of social vulnerability

Because of sample size and power considerations, we were unable to evaluate separately SES and marital status as components of social vulnerability. While marital status has generally been the stronger predictor of treatment in population-based studies of prostate cancer treatment, it is quite possible that the SES measures used (especially education) were inadequate for capturing social class and other important aspects of socioeconomic position.^{29 32} In general, however, SES is highly correlated with marriage and other forms of social support. Lower SES groups lack the level of social networks and supports reported by higher SES groups.³³ Ultimately, we believe that marriage has a particularly salient influence on treatment in prostate carcinoma. Spouses may advocate for more aggressive treatment for their husbands² and, as our vignette suggests, physicians may view married men as better candidates for surgery because they expect them to have greater emotional and instrumental support during the decision-making period and following treatment.

Limitations

We recognize that our results may not be generalizable to actual patients. In addition, they would not be applicable to many patients whose clinical characteristics differ from those in the vignette. For example, if the patient we presented had been much younger or had had higher risk disease, this would likely have attenuated the differences we found in rates of recommendation for radical prostatectomy. It is possible that physical features of the photographed models (e.g. facial expression, hairstyle, hand gestures), rather than skin color alone, influenced urologists' recommendations.³⁴ There was also some potential for non-response bias. Despite these limitations, we believe the vignette offers a compelling illustration of how the race/ethnicity of patients might influence physician perceptions of social vulnerability to affect treatment recommendations. These, in turn, could help to explain overall disparities in treatment actually received. Our findings are bolstered by a balanced, randomized design,

a large, nationally-representative sample of urologists who treat prostate carcinoma, and by the ability to study the effects of patient race and social vulnerability in the absence of common, unmeasured confounders.

Conclusion

Our results reaffirm the importance in health disparities research of modeling interactions between race/ethnicity and multiple variables that reflect diverse aspects of a patient's socioeconomic circumstances. In the clinical domain, because treatment recommendations may be influenced by perceptions of social vulnerability, which in turn may be affected by knowledge of a patient's race/ethnicity, physicians should avoid making assumptions and instead base recommendations on detailed information about a patient's actual financial and supportive resources, including the presence and quality of the spousal relationship.

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Table 1: Sociodemographic and clinical practice characteristics of survey respondents

<u>Category</u>	<u>Percent</u>	<u>Category</u>	<u>Percent</u>
Respondents	1,313 (66.1%)	Average brachytherapies / yr	
		None	32.0
Male	97.9	1-10	25.9
		11-30	31.9
Mean age, yr (s.d.)	52.8 (10.3)	>30	9.0
Mean yrs in practice (s.d.)	19.5 (10.2)		
		Size of metropolitan area (CBSA)	
Race/ethnicity		<10,000	1.7
Caucasian	83.3	10,000 to 49,999	10.3
African-American	2.0	50,000 to 2.5 million	57.8
Latino	2.1	≥2.5 million	30.3
Asian/ Pacific Islander	10.5		
Other	2.1	Hospital bed size of primary practice	
		<100 beds	7.8
Completed fellowship	7.2	101-300 beds	64.7
		>300	27.5
Type of Practice			
Academic	7.0	Race of Patient Population	
Private	93.0	<10% African-American	52.4
		10-30% African-American	36.6
		>30% African-American	11.0
Average prostatectomies / yr		Ethnicity of Patient Population	
None	10.9	<10% Latino	71.9
1-10	33.2	10-30% Latino	22.7
11-30	41.7	>30% Latino	5.4
>30	14.1		

Table 2: Urologist treatment recommendations: RP vs. XRT* (n=1,205)

Patient variables	RP % (n)	XRT % (n)	Risk difference [†] (%)	Relative Risk [‡]	p [§]
Black	31.6 (194)	68.4 (419)	0.0	1.00	0.74
White	31.6 (187)	68.4 (405)	(-0.1-0.1)	(0.85-1.18)	
High Vulnerability	26.8 (155)	73.2 (424)	9.3	0.74	0.0005
Low Vulnerability	36.1 (226)	63.9 (400)	(4.1-14.5)	(0.63-0.88)	
Black, High Vulnerability	23.9 (68)	76.1 (216)	14.4	0.63	0.05
Black, Low Vulnerability	38.3 (126)	61.7 (203)	(7.1-21.6)	(0.49-0.80)	
White, High Vulnerability	29.5 (87)	70.5 (208)	4.2	0.88	
White, Low Vulnerability	33.7 (100)	66.3 (197)	(-3.3-11.7)	(0.69-1.11)	

* RP – radical prostatectomy; XRT – radiotherapy (brachytherapy or external beam).

[†] Risk difference: second minus first group receiving a recommendation for RP vs. XRT.

[‡] Relative risk: first versus second group receiving a recommendation for RP vs. XRT.

[§] Wald chi-square level of significance based on full logistic regression model of patient race, social vulnerability, and race * social vulnerability interaction on radical prostatectomy versus radiotherapy.

Table 3: Urologist treatment recommendations: Curative vs. WW* (n=1,313)

Patient variables	Curative % (n)	WW % (n)	Risk difference [†] (%)	Relative Risk [‡]	p [§]
Black	94.5 (623)	5.5 (36)	-1.9	1.02	0.41
White	92.7 (606)	7.3 (48)	(-4.5-0.1)	(1.00-1.05)	
High Vulnerability	91.5 (590)	8.5 (55)	4.2	0.96	0.004
Low Vulnerability	95.7 (639)	4.3 (29)	(1.5-6.8)	(0.93-0.98)	
Black, High Vulnerability	93.8 (289)	6.2 (19)	1.3	0.99	0.10
Black, Low Vulnerability	95.2 (334)	4.8 (17)	(-3.3-11.7)	(0.95-1.02)	
White, High Vulnerability	89.3 (301)	10.7 (36)	6.9	0.93	
White, Low Vulnerability	96.2 (305)	3.8 (12)	(3.0-10.8)	(0.89-0.97)	

* Curative therapy – radical prostatectomy, radiotherapy or cryotherapy. WW – watchful waiting.

[†] Risk difference: second minus first group receiving a recommendation for curative therapy vs. WW.

[‡] Relative risk: first versus second group receiving a recommendation for curative therapy vs. WW.

[§] Wald chi-square level of significance based on full logistic regression model of patient race, social vulnerability, and race * social vulnerability interaction on curative therapy versus watchful waiting.

Appendix

Vignette: Please consider the following information and then offer a treatment recommendation:

Patient: 70 year-old (African American vs. White) male.

Social: (Widowed three years ago, unemployed, lives alone in low-income housing close to a major medical center. vs Married, retired electrical engineer, lives close to a major medical center, wife is very concerned.)

Insurance: Medicare

Diagnosis: Localized (organ-confined) prostate cancer (TRUS=DRE;
No nodule)

Gleason grade: 3+3

Biopsy: 2 out of 12 cores on the left each had 10% tumor

PSA: 3.2 (was 4.8 two years ago, by primary care provider)

CT scan: No evidence of regional lymph node involvement

Bone scan: Negative

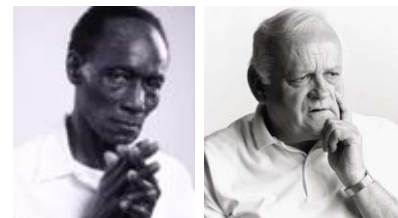
Prostate size: 35 grams

Family history of prostate cancer: None

AUA symptom score: 6 (i.e. mild urinary symptoms)

Sexual function: Normal erections satisfactory for intercourse

Comorbidities: Essential hypertension on an ACE-inhibitor. Otherwise healthy and active.



Patient concerns: Patient understands the potential side effects of all treatment alternatives.

He says he wants a chance at cure more than anything but very much wants to avoid treatment that interferes with his sexual function.

He is anxious to know your treatment advice and is willing to carry through with anything you recommend.

Given the following four options only, please indicate which one you are *most likely* to recommend (**mark only one answer**):

- ☐ Radical prostatectomy with optional nerve sparing
- ☐ A form of radiation: ☐ brachytherapy OR ☐ external beam
- ☐ Observation (“watchful waiting”)
- ☐ Cryotherapy

If given the opportunity, would you recommend a form of hormonal therapy instead of, or as an adjunct to, your choice, above?

- ☐ Hormonal therapy alone (i.e. instead of above choice)
- ☐ Hormonal therapy as an adjunct to above choice
- ☐ No hormonal therapy