Published in final edited form as:

J Urol. 2017 February ; 197(2): 350–355. doi:10.1016/j.juro.2016.08.007.

Emotional distress increases the likelihood of receiving surgery among men with localized prostate cancer

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Abstract

Purpose—To determine if, among men with clinically localized prostate cancer (PCa), and in particular, men with low risk disease, greater emotional distress increases the likelihood of receiving surgery over radiation or active surveillance.

Materials and Methods—Participants were 1531 patients recruited from 2 academic and 3 community facilities (83% non-Hispanic white, 11% non-Hispanic black, 6% Hispanic; 36% low risk, 49% intermediate risk, 15% high risk; 24% chose active surveillance, 27% chose radiation, 48% chose surgery). Emotional distress was assessed shortly after diagnosis and after men made the treatment decision with the Distress Thermometer. We used multinomial logistic regression with robust standard errors to test if emotional distress at either time point predicted treatment choice in the sample as a whole and after stratifying by D'Amico risk score.

Results and Conclusions—In the sample as a whole, participants who were more emotionally distressed at diagnosis were more likely to choose surgery over active surveillance (RRR=1.07, 95% CI=1.01, 1.14, $p=.02$). Men who were more distressed close to the time they made their treatment choice were more likely to have chosen surgery over active surveillance (RRR = 1.16, 95% CI = 1.09, 1.24, $p<.001$) or surgery over radiation (RRR=1.12, 95% CI=1.05, 1.19, $p=.001$). This pattern was also found among men with low risk disease. Emotional distress may motivate men with low risk PCa to choose more aggressive treatment. Addressing emotional distress prior to, and during treatment decision-making may reduce a barrier to uptake of active surveillance.

Keywords

Prostatic Neoplasms; emotional stress; watchful waiting; decision making; medical overuse

Introduction

Overtreatment of prostate cancer (PCa), has become a significant concern in PCa care. Estimates of the magnitude of overtreatment vary widely, but nearly all studies point to some degree of unnecessary treatment,¹ in particular, among men with low risk disease which has a very low mortality risk.² For men with low risk disease, active surveillance or periodic monitoring for cancer progression with the potential for conversion to definitive therapy such as surgery or radiation is often a viable course of management.^{2,3} Research on the under-utilization of active surveillance has focused on patients' clinical characteristics such as age and comorbid disease⁴ and to some degree their beliefs and preferences.^{5,6} However, it is well established that emotions also drive patient decision-making, including cancer-related decision-making.⁷ Understanding the role of emotion in PCa treatment decision making has the potential to reveal new approaches to helping men make treatment decisions that are informed by an understanding of treatment options, outcomes, and side-effects, and their preferences and values. The goal of the present work is to examine whether PCa patients who are more emotionally distressed after diagnosis choose surgery over radiation or active surveillance.

A number of patient beliefs are associated with choosing more aggressive treatment. Men who are concerned about cancer progression and give importance to tumor removal are more likely to choose surgery^{8,9} and more likely to convert to definitive therapy if on active surveillance.¹⁰ A desire to take action in the face of the cancer threat may also motivate choosing definitive therapy.¹¹ Among definitive therapies, surgery may be viewed as the most aggressive by many patients who reason that radiation offers adequate cancer control with fewer side effects.⁸

We know that many men, by most estimates a quarter to a third of men, experience significant distress when diagnosed with PCa.^{12–14} As there are effective interventions for emotional distress in cancer patients,¹⁵ there is considerable utility in testing whether patient distress is partially driving overtreatment of low risk PCa. In one study, distress during decision-making was associated with having chosen surgery over radiation or active surveillance;⁹ however, we do not know whether emotional distress at diagnosis predicts choosing surgery. This study addresses this gap in the literature. We hypothesized that emotional distress at diagnosis and emotional distress soon after treatment decision making would be associated with higher likelihood of choosing surgery over radiation or active surveillance. We tested these hypotheses both in the sample as a whole, and, of particular interest, in men with low risk disease. If early emotional distress influences treatment choice, it might be possible to intervene shortly after diagnosis and improve the quality of the treatment-decision making process as well as patients' quality of life.

Methods

Procedure

Data were from the Live Well Live Long! study of PCa treatment decision making and survivorship.¹⁶ Participants with newly diagnosed clinically localized PCa were approached at two comprehensive cancer centers and three community facilities between July 2010 and

August 2014. Of the 3337 patients approached to participate, 2,476 were consented; 2,008 completed the first survey. Data for the present analyses were from this first survey completed upon consent, a second survey completed after participants had made their treatment decision but prior to treatment, and were abstracted from participants' medical records. In total, 1631 completed both surveys and had medical record data. Twenty-three participants who reported a race/ethnicity other than non-Hispanic Black, non-Hispanic white, and Hispanic were not included due to the small size of this group. Data were also excluded for participants (n = 77) who had missing observations for any of the model covariates (D'Amico risk, comorbidities, education, race/ethnicity, marital status, employment status, age at diagnosis, recruiting site), yielding a final sample of 1531. Study procedures were institutional review board-approved and participants completed a written informed consent.

Measures

We measured *emotional distress* with the Distress Thermometer, an 11-point single-item visual analog scale ranging from 0 (no distress) to 10 (extreme distress) shortly after consent (baseline) and again as soon as participants had made their treatment decision. The Distress Thermometer has been validated and is a recommended distress screening tool for use in PCa patients,^{17–20} with good specificity and sensitivity for detecting cancer-specific distress.¹⁸

We stratified participants' *disease risk* by D'Amico risk score, a widely used system for categorizing PCa disease risk.²¹ To calculate the scores we abstracted clinical stage, pre-treatment biopsy Gleason score, and pre-treatment PSA from participants' medical records. Low-risk PCa was defined as PSA ≤ 10 ng/ml, Gleason score ≤ 6, and American Joint Commission of Cancer Staging (AJCC) less than cT2b.²² Intermediate-risk PCa was defined as PSA >10 and ≤ 20 ng/mL or Gleason 7 disease or AJCC cT2b. High-risk disease was defined as PSA >20 ng/mL or Gleason 8–10 disease or AJCC cT2c or higher.²²

We assessed several potential *comorbidities*. Whether participants had diagnoses of cardiovascular disease (CVD) (myocardial infarction, coronary artery disease, congestive heart failure, peripheral vascular disease, cerebrovascular disease), diabetes, or hypertension was abstracted from patients' medical histories. For 122 participants, whether they had coronary artery disease was not abstracted. These cases were coded as having coronary artery disease if they self-reported the condition at baseline.

We assessed self-reported *years of education*, *household income*, *race/ethnicity*, *marital status*, *employment status* (employed vs. not employed), and date of birth, from which *age at diagnosis* was calculated. *Recruiting site* was recorded by participant recruiters. All assessments were made at baseline.

We assessed men's *confidence in cancer control* or beliefs that their cancer would not progress with the cancer control subscale of Clark and colleagues' ²³ multidimensional PCa quality of life scale. Two items were slightly adapted to be more appropriate for patients who have not yet been treated. Participants responded to five statements using a 5-point Likert-type response format (1=strongly agree, 5=strongly disagree) ($\alpha=0.75$). Example

items included, 'I am confident that the cancer will be brought under control,' and, 'I worry about the cancer spreading'.

Data Analyses

We used multinomial logistic regression to test whether distress at diagnosis or after having made the treatment decision was associated with greater likelihood of choosing surgery over radiation or active surveillance. We tested models for both baseline and treatment decision-making distress in both the full sample and after stratifying by disease risk (D'Amico score). We controlled for disease risk except when it was a stratification variable. We also controlled for comorbidities that can contraindicate surgery (cardiovascular disease, diabetes, hypertension), as well as for demographic variables potentially associated with differences in type of treatment received (education, race/ethnicity, employment status, marital status, and age). We controlled for recruiting site, although this variable is not included in the tables as the choice of referent site is arbitrary. We also repeated all analyses after adding a measure of confidence in cancer control to verify that associations between distress and type of treatment received were not due solely to concern about the cancer progressing. Shared recruiting site introduced non-independence into the data; therefore, we used robust standard errors in all models so that if the correlation structure was not correctly specified, the standard errors would still be valid.

Results

Participant characteristics

Most participants had low risk (35.7%) or intermediate (49.1%), rather than high risk disease (15.2%). They were most likely to have been treated with surgery (48.4%), followed by radiation (27.4%) and active surveillance (24.2%). Men's mean emotional distress at baseline was 4.37 (SD = 2.56) out of 10 and was somewhat reduced after they had made their treatment decision (M = 4.10, SD = 2.58) ($t(1462) = 5.36$, $p < .001$). Distress and confidence in cancer control were negatively associated both at baseline ($r = -0.38$, $p < .001$) and soon after having made the treatment decision ($r = -0.34$, $p < .001$). Participant characteristics are described in detail in Table 1.

Multivariable analyses

The overall pattern of associations between distress and treatment choice were similar for distress shortly after diagnosis and after treatment decision making, although associations were stronger for the latter. Distress shortly after diagnosis predicted choosing surgery over active surveillance (RRR = 1.07, 95% CI = 1.01, 1.14, $p = .021$) (Table 2). Distress shortly after the treatment decision was associated with having chosen surgery over active surveillance (RRR = 1.16, 95% CI = 1.09, 1.24, $p < .001$) and surgery over radiation (RRR = 1.12, 95% CI = 1.05, 1.19, $p = .001$) (Table 3). In the group of primary interest, men with low risk disease, distress shortly after diagnosis was associated with choosing surgery over active surveillance (RRR = 1.11, 95% CI = 1.02, 1.22, $p = .019$) (Table 1, Supplemental Material). Distress at treatment decision was associated with choosing surgery over active surveillance (RRR = 1.21, 95% CI = 1.10, 1.34, $p < .001$) and surgery over radiation (RRR = 1.25, 95% CI = 1.09, 1.45, $p = .002$) (Table 2, Supplemental Material). In men with

intermediate risk disease, distress at decision-making but not distress shortly after diagnosis was associated with greater likelihood of choosing surgery over active surveillance (RRR = 1.15, 95% CI = 1.03, 1.28, $p = .014$) and surgery over radiation (RRR = 1.09, 95% CI = 1.00, 1.19, $p = .05$) (not shown in tables). In men with high risk disease, distress was not associated with treatment choice (not shown in tables). Findings were also replicated, and in fact strengthened when we controlled for confidence in cancer control (Tables 3 and 4, Supplemental Materials).

Other determinants of treatment choice

The pattern of associations between covariates and treatment choice were nearly identical for models that included distress at baseline (Table 2) or distress just after decision-making (Table 3). Having higher risk disease was associated with choosing surgery or radiation over active surveillance and having CVD with lower likelihood of choosing surgery over active surveillance or radiation and higher likelihood of choosing radiation over active surveillance. Being more educated was associated with lower likelihood of choosing surgery or radiation over active surveillance. Being Black, compared to white, was associated with higher likelihood of choosing radiation over active surveillance or surgery. Being married was associated with higher likelihood of choosing surgery over active surveillance and in the distress at decision-making model, greater likelihood of choosing surgery over radiation. Being older was associated with lower likelihood of choosing surgery over active surveillance or radiation.

Discussion

Men's level of emotional distress shortly after diagnosis predicted greater likelihood of choosing surgery over active surveillance. Importantly, this was true among men with low risk disease, for whom active surveillance may be a clinically viable option and side-effects of surgery or radiation might be unnecessary. Distress was slightly lower after men had made their treatment decision, but it remained a predictor of having chosen surgery over active surveillance and surgery over radiation in the sample as a whole and in men with low risk disease. A number of studies have shown that emotional distress is relatively high among newly diagnosed men,^{12,16,24} but our study is novel as it demonstrates both prospectively and cross-sectionally that emotional distress motivates PCa patients to choose more aggressive treatment.

It is well-established that key reasons men choose surgery is believing that PCa is a serious disease⁹ and surgery is their best option for cancer control.^{8,9,25} Fear of cancer progression and death is likely one source of distress among PCa patients, and may partially account for the relationship between distress and choosing surgery over other treatment modalities. Indeed, in our sample, confidence in cancer control was inversely associated with emotional distress, and was uniquely associated with choosing surgery over active surveillance and radiation; it seems that the men considering or who chose surgery were more confident that their cancer would be cured. It is also true that distress predicted choosing surgery even when controlling for confidence in cancer control. We previously reported that low self-efficacy for decision-making, low confidence in cancer control, and masculine identity threat

are also associated with distress at diagnosis, and dispositional optimism and resilience protected against distress.¹⁶ Intervening in any of these determinants of early distress might therefore have the additional benefit of reducing overtreatment.

Patterns of associations between demographic characteristics and treatment choice were consistent with other reports in the literature. For example, younger PCa patients (i.e., longer life expectancy) are more likely to receive aggressive treatment than older patients.^{4,8} Married men also choose more aggressive treatment.^{26,27} Family roles and partners' social influence may lead partnered men to choose a treatment that they believe will maximize their chance of cure and longevity.²⁸ In contrast, some unmarried men may place relatively greater value on sexual function and avoid surgery because they believe it poses the greatest threat of erectile dysfunction. In our sample and nationally, Blacks are disproportionately more likely to receive radiation; however, unlike in national samples, participants did not receive surgery at a lower rate compared to whites.²⁹ As CVD can be a contra-indication for surgery it is not surprising that it was associated with lower likelihood of choosing surgery. However, in our sample, having CVD was counterintuitively associated with greater likelihood of choosing radiation over active surveillance. One would have expected significant comorbidity to be associated with lower projected life expectancy and lower likelihood of receiving definitive therapy..

Our study had a number of limitations; our sample is not nationally representative of all men diagnosed with clinically localized disease and had relatively high mean socioeconomic status. We may have underestimated the effect of distress on choosing aggressive treatment if men who were more emotionally distressed were less likely to participate. The Distress Thermometer is a widely used screening tool for psychological distress; however, it is a single item with associated potential for measurement error. Future research might replicate this study using a multidimensional scale such as the Hospital Anxiety and Depression Scale (HADS). We might also test whether knowing patients' history of affective disorders could help screen for individuals who will choose aggressive therapy due to emotional distress. Future work might also examine if partners' distress motivates uptake of aggressive treatment.

Conclusions

Emotional distress prior to treatment decision-making is not only a concern with respect to patients' psychosocial well-being; it may impact the treatment decision-making process, motivating men to choose surgery over other treatments. Significantly, we found this pattern to be true among men with low risk disease who might be good candidates for active surveillance. Effects may be direct through men's preferences (i.e., more distressed men prefer the best chance of cure), or indirect if physicians recommend more aggressive treatment to men who are more anxious about cancer control.³⁰ In both instances, early interventions to reduce distress (e.g., additional explanation about PCa prognosis, decision aids, brief cognitive behavioral therapy, use of relaxation or mindfulness apps) may benefit both the treatment decision-making process and patients' psychosocial well-being. Our findings support recent trends in promoting screening for emotional distress, but highlight the value of doing so early on, prior to men making their treatment decisions. Early work on

treatment choice primarily focused on cognitive determinants such as physician recommendations, beliefs, preferences, and the influence of anecdotal information.^{8,9,25} Our study, and recently work on the role of fear of treatment and side-effects indicates the importance of emotional processes in men's PCa treatment decisions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The Live Well Live Long! research group includes Integrated Medical Professionals, site-PI, Carl A. Olsson and CEO Deepak A. Kapoor; Memorial Sloan Kettering Cancer Institute, site-PI, Christian J. Nelson; Urology San Antonio, site-PI Juan A. Reyna; Houston Metro Urology, P.A., site-PI Zvi Schiffman, Roswell Park Cancer Institute, site-PI, Willie Underwood, III, and the University at Buffalo, site-PI, Heather Orom. We would like to acknowledge the cooperation and efforts of the staff and physicians at these sites for their significant contribution to participant recruitment. This research was supported by funding from the National Cancer Institutes (R01#CA152425).

Glossary

PCa	prostate cancer
CVD	cardiovascular disease
RRR	relative risk ratio
CI	confidence interval
AJCC	American Joint Commission of Cancer Staging
PSA	prostate-specific antigen

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Table 1

Participant characteristics (N=1,531)

Characteristic	N	% or mean (SD)
D'Amico Risk		
Low	547	35.73
Intermediate	752	49.12
High	232	15.15
CVD	188	12.28
Hypertension	752	49.12
Diabetes	200	13.06
Education		
<12 years	48	3.14
12 years	275	17.96
13–16 years	699	45.65
17– 20 years	509	33.24
Income		
<25,000	80	6.18
25,000–49,999	149	11.50
50,000–74,999	195	15.06
75,000–99,999	186	14.36
100,000	685	52.90
Race/Ethnicity		
Non-Hispanic White	1268	82.82
Non-Hispanic Black	164	10.71
Hispanic	99	6.47
Married	1290	84.26
Employed	894	58.39
Age at diagnosis	1531	63.20 (7.98)
Treatment received		
Active surveillance	361	24.20
Radiation	409	27.41
Surgery	722	48.39
Distress at baseline	1476	4.37 (2.56)
Distress at decision making	1516	4.10 (2.58)

Notes. Percentages were calculated based on valid data.

Table 2

Treatment choice as a function of baseline emotional distress (N =1440)

Variable	Surgery vs. AS			Surgery vs. Radiation			Radiation vs. AS		
	RRR	95% CI	p-value	RRR	95% CI	p-value	RRR	95% CI	p-value
Distress	1.07	1.01, 1.14	0.021	1.02	0.96, 1.10	0.493	1.05	0.97, 1.13	0.203
D'Amico risk									
Intermediate	11.50	7.95, 16.63	0.000	1.16	0.76, 1.76	0.497	9.94	6.35, 15.56	0.000
High	21.86	11.16, 42.82	0.000	1.39	0.80, 2.41	0.242	15.74	7.78, 31.85	0.000
Hypertension	1.02	0.75, 1.40	0.888	0.92	0.65, 1.30	0.645	1.11	0.76, 1.63	0.598
Diabetes	0.90	0.57, 1.42	0.658	0.72	0.45, 1.15	0.166	1.26	0.75, 2.10	0.380
CVD	0.59	0.36, 0.96	0.034	0.28	0.17, 0.46	0.000	2.09	1.26, 3.45	0.004
Years of education	0.94	0.89, 0.99	0.026	1.03	0.97, 1.09	0.336	0.91	0.85, 0.98	0.007
Race									
Non-Hispanic Black	0.97	0.52, 1.82	0.928	0.43	0.26, 0.71	0.001	2.26	1.23, 4.14	0.008
Hispanic	0.89	0.40, 1.99	0.782	0.64	0.33, 1.25	0.189	1.40	0.63, 3.11	0.415
Married/cohabitating	1.86	1.18, 2.95	0.008	1.44	0.90, 2.32	0.131	1.29	0.78, 2.15	0.325
Employed	0.95	0.67, 1.36	0.794	1.09	0.74, 1.59	0.665	0.88	0.58, 1.33	0.540
Age	0.89	0.87, 0.92	0.000	0.88	0.86, 0.91	0.000	1.02	0.98, 1.05	0.372

Note. Referent groups were low risk and Non-Hispanic white. All models controlled for recruitment site.

Table 3

Treatment decision as a function of treatment decision-making distress (N = 1477)

Variable	Surgery vs. AS			Surgery vs. Radiation			Radiation vs. AS		
	RRR	95% CI	p-value	RRR	95% CI	p-value	RRR	95% CI	p-value
Distress	1.16	1.09, 1.24	0.000	1.12	1.05, 1.19	0.001	1.04	0.97, 1.12	0.296
D'Amico risk									
Intermediate	12.42	8.56, 18.02	0.000	1.20	0.79, 1.82	0.404	10.39	6.62, 16.30	0.000
High	22.08	11.39, 42.78	0.000	1.43	0.83, 2.47	0.196	15.41	7.71, 30.79	0.000
Hypertension	1.00	0.73, 1.38	0.975	0.91	0.65, 1.27	0.580	1.11	0.76, 1.62	0.605
Diabetes	0.96	0.61, 1.51	0.846	0.76	0.48, 1.21	0.246	1.25	0.75, 2.10	0.387
CVD	0.56	0.34, 0.91	0.019	0.28	0.17, 0.45	0.000	2.03	1.23, 3.34	0.005
Years of education	0.94	0.89, 0.99	0.025	1.02	0.96, 1.09	0.448	0.92	0.86, 0.98	0.012
Race									
Non-Hispanic Black	0.98	0.53, 1.81	0.936	0.46	0.28, 0.76	0.002	2.11	1.17, 3.80	0.013
Hispanic	0.96	0.42, 2.18	0.919	0.70	0.36, 1.38	0.300	1.37	0.61, 3.09	0.447
Married/cohabitating	1.94	1.23, 3.07	0.005	1.61	1.01, 2.56	0.046	1.21	0.73, 1.99	0.460
Employed	0.94	0.66, 1.34	0.748	1.10	0.75, 1.60	0.632	0.86	0.57, 1.30	0.480
Age	0.90	0.87, 0.92	0.000	0.89	0.86, 0.91	0.000	1.01	0.98, 1.05	0.480

Note. Referent groups were low risk and Non-Hispanic white. All models controlled for recruitment site.